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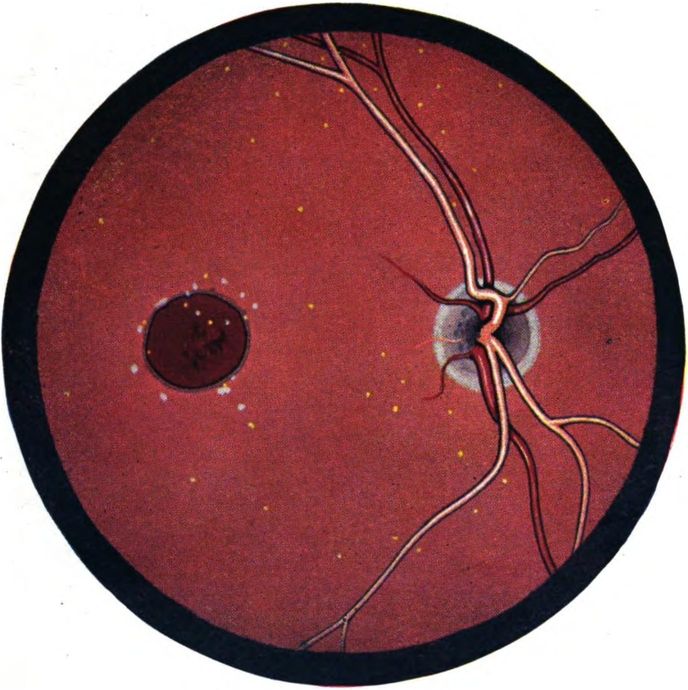

Hole in Macula in Negro, Burkholder's Case.

THE
Practical Medicine Series

COMPRISING EIGHT VOLUMES ON THE
YEAR'S PROGRESS IN MEDICINE AND SURGERY

Under the General Editorial Charge of

CHARLES L. MIX, A. M., M. D.

Professor of Physical Diagnosis in the Northwestern
University Medical School

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Volume III

The Eye, Ear, Nose and Throat

EDITED BY

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ALBERT H. ANDREWS, M.D.
GEORGE E. SHAMBAUGH, M.D.

SERIES 1918

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PREFACE.

The World Conflict has affected even ophthalmic literature. It has also killed off some of our most useful observors, experimentors and writers, and it has lessened the number of contributions to the science and art of ophthalmology. On the other hand, there has resulted a flood of writings on the *Military Surgery of the Eye,* and the Editor has devoted considerable space to the chapter on War Surgery as related to the ocular apparatus.

The movement to bring about a merger of the principal ophthalmic journals in the United States has proved a decided success. The *American Journal of Ophthalmology*. the name of the new periodical, with Dr. Edward Jackson as Editor-in-Chief, assisted by an efficient editorial board, has been issued monthly since January, 1918. A number of abstracts from this publication appear in the present volume.

The Editor desires to acknowledge, as in former years, the aid he has received from the staff of *Ophthalmology,* through the courtesy of its well-known Editor, Dr. H. V. Würdemann; from the *Annals of Ophthalmology;* from the *Journal of the American Medical Association*, and from the *British Journal of Ophthalmology*. From all of these he has utilized a number of valuable abstracts.

The Editor has appended remarks, when occasion warranted, to papers by other writers.

CASEY WOOD.

DISEASES OF THE EYE.

EXAMINATION OF THE EYE.

Tests for Visual Acuity. For the subjective testing of refraction, Edward Jackson[1] believes that the international broken ring test is inferior to the test letters; but for testing acuteness of vision, it is distinctly better. When, however, the broken ring is arranged like test letters in successive lines of varying sizes, it has no advantage over the test letters, and some disadvantages. It is when a single size of broken ring is arranged in a symmetrical card that its advantages of greater accuracy and convenience appear. So arranged it is to be used by varying the distance of the test from the person to be tested. A set of such cards is presented, of four sizes. On one the broken ring is 72.5 millimeters in diameter. To see the break in the ring at five meters indicates vision of 0.1. The other card has rings of 36.2 and the other two cards indicate vision of 1. at 5 meters and vision of 2. at 5 meters. A table is presented giving the indications of these four tests at various distances.

To use this test, the card is held close to the patient, the break in the ring pointed out, and he is asked to indicate its direction. When he understands fully what is expected, the card is taken to a distance, the break in the ring turned in some other direction and the patient asked to indicate its new position. If unable to see the ring at that distance, it is brought nearer until the direction of the break is recognized.

[After all is said and done, it is a question, taking into account the amount of time necessary to explain

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(1) Ann. Ophth., January, 1917; see also Practical Medicine Series, 1917, pp. 13-16, Vol. III.

to the patient the method of using the international broken ring test and the added minutes required to reiterate these lessons, whether much is to be gained by them over a well-selected and properly printed test-letter chart.

If the examiner is judicious in his method of examination, he will, in the majority of instances, be able to obtain the necessary information both as to refraction and as to the visual acuity of the patient. This opinion is, of course, only that of the Editor, but it is his belief that it will be concurred in, after a year or so of experience, by the majority of ophthalmologists.—Ed.]

Haitz Binocular Location of Scotoma by Means of the Stereoscope. The stereoscopic method of Haitz is claimed by David Wells[2] to be the most valuable method for the measurement of central and paracentral scotoma. He obtained from Berlin the Haitz Charts with the accompanying instructions and the latter he has had carefully translated and publishes the exact translation. The method is only adapted to the field of vision in the first 10° zone, but in case of emergency can be extended to 20°. The examination of the 10° zone is undertaken with the kampimeter charts Nos. 2 and 1. Each portfolio contains a set of scotometer charts and the smaller central blind spots are more quickly discovered with these than the kampimeter charts. They have advantage over all other scotometers in that by reason of their binocular nature they force the defective eyes, with peculiar constraint to maintain the central position. The scotometer charts will have a special advantage for examination of the central color defects in retrobular neuritis. The usual American stereoscope is used which is fitted with lenses of 5.25 diopters with their optical centers placed about 8.5 cm. apart. It is necessary first to make a test of the central accuity of vision. Ametropic persons should wear their glass. Patients with manifest strabismus are excluded from this test. The test should be broken by rest pauses. The examination takes place as usual by means of a movable object. The division of the degrees is such that distance between them amounts exactly to a visual

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(2) Jour. Ophth., Otol. and Laryngol., January, 1917.

angle of 1° when the charts are in a normal position, and this side of the chart is always to be placed before the eye to be tested. Chart No. 1 is for crude tests and Chart No. 2 for the finer details. The marker is carried just parallel to the lines both horizontal and vertical from the outside toward the zero meridian. The holder is as fine as a knitting needle and carries an object of 1.5 and 2 mm. in size. The first is for use in the zone between zero and 5° and the latter between 5° and 10°. He advises against recording the results upon the usual perimeter charts because their unit is too small for these examinations. It is best to record the result by the help of a rubber stamp upon the back of the chart.

Radiography of the Eye and Orbit. The subject is divided by George Dixon[3] into examination for foreign bodies in the eye and orbit, tumors of the orbit, and fractures. The frequency with which foreign bodies are found by *x*-ray where nearly every other diagnostic point is against such a finding is pointed out. All metals except small pieces of aluminum can easily be shown and also pieces of stone and glass; but small or even moderately large pieces of wood can not be detected by means of the *x*-ray unless they should happen to be painted or heavily varnished. The writer considers that it makes little difference what particular method is used for the localization of foreign bodies in the eye if the operator is thoroughly familiar with it and recognizes the importance of paying the strictest attention to the smallest details. All the methods of real value are based on the same principle, *i. e.*, triangulation as first employed for this purpose by Sweet in this country and by Mackenzie-Davidson in England. He describes briefly the method of plotting and gives the histories of a number of odd or unusual accident cases.

Dixon gives many valuable suggestions in connection with this subject including the following points: A single plate should never be wholly relied upon, since occasionally the first one may not show the foreign body, and again a defect in the plate may be mistaken for a foreign body. A prolapsed iris does not always mean that the foreign body has been large nor does it exclude

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(3) New York State Jour. Med., February, 1917.

the presence of a foreign body. Though it is important for the radiographer to obtain a good history of the accident from the patient in order to obtain some idea of the nature of the foreign body, the statement of the patient is often of little value except as to the manner in which the accident occurred. Lead and iron will always yield strong shadows no matter how small, but glass throws a weak one and consequently the tube used for glass should be much lower than one used for iron; glass does not usually travel very far into the globe and generally presents its edge to the source of the ray, thus making localization easier than if the opposite were the rule.

Failure to find a wound of entrance is no proof that the globe does not harbor a foreign body. Siderosis is pretty good evidence that a particle of iron is the cause, and strange as it may appear this is occasionally overlooked. Cataract in a young person is generally due to an injury of some sort and frequently a foreign body is found though the patient may strenuously disclaim the occurrence of an accident of any kind. If a skiagraph is not made in a given case, a second foreign body may be left in the eye. Failure to secure the foreign body does not mean that it is not present; the shadow may be of iron rust only; the foreign body may be lost either outside or inside the orbit, or it may be non-magnetic or so slightly magnetic that the surrounding medium forms more resistance to its extraction than the magnet has power to overcome. The attention of the general radiographer is called to the fact that he does not always recognize the necessity of fixing the vision during exposure, and for this reason he sometimes misses a small foreign body completely.

It has not been possible to show intra-ocular tumors by means of the *x*-ray, but orbital tumors can be shown and a very fine idea of their size and location can be obtained provided they are not too diffuse. The position of the head and direction of the ray must be such as to throw out the opposite orbit and as many of the ethmoidal cells as possible when exposing for the lateral view. The position for the antero-posterior view is the same as for the frontal sinus. If a neighboring sinus is occluded and invasion of the orbit incomplete we can be pretty sure that it is primary in the sinus; if the reverse obtains, then it is fair to assume that it is primary in the orbit, provided there is no evidence of empyema in either case.

Fractures about the orbit unless they be in the outer margins are most difficult—further back it is next to impossible to show the line unless the fracture be so extensive that its presence would be self-evident and a skiagraph unnecessary.

A Method of Examining the Anterior Segment of the Eyeball. This plan is suggested by H. Lucanus.[4] The eye is illuminated with the ophthalmoscope from a distance of about 0.5 m. through convex 6, held as far as possible from the eye, by which a double linear magnification of the cornea is obtained. In this way details may be recognized which on oblique illumination and the loupe are scarcely visible, *e. g.*, light-colored foreign bodies and minute lesions of the epithelium are marked as black points or streaks. Any recent inflammatory focus of the cornea appears dark, any old healed area light, *i. e.*, only slightly opaque. Very fine, dust-like deposits on Descemet's membrane in incipient iritis come into view as a vertical line of minute particles below the center of the cornea toward the margin, which can not be seen otherwise. Also incipient opacities of the lens, accumulation of very fine opacities at the posterior surface of the lens in some forms of uveitis and the slight opacities in the anterior portion of the vitreous can be easily detected. The essential point of the method is the combination of incident and reflected light.

Making the Ophthalmometer More Helpful. To have the focal center of the patient's cornea coincide with that of the lenses in the telescope, S. Mitchell[5] uses a piece of plain white paper two inches square, having an aperture ⅞ of an inch in diameter in its center. This square of paper is slipped over the end of the telescope, and the patient is instructed to look at the round center that presents in the square field of white. Since adopt-

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(4) Archiv. f. Augenhlk., vol. 81, p. 197.
(5) Ophth. Record, March, 1917.

ing this simple procedure, he does not recall a single failure to secure the desired result (Fig. 1).

[If the practicing ophthalmologist can, by any possible means, instruct a nurse—not necessarily a graduate nurse—to work out his fields of vision (the training will not occupy more than a month or so of time nor more than an hour a day), he can readily convert the most commonplace assistant into an expert "perimetrist." The Editor has had such an experience and with the most satisfactory results. In his office a nurse invariably measured the fields of vision. She had gradually acquired a practical knowledge of the various types of perimeters; she was well acquainted with the ordinary literature of the subject; she had read all the English text books on perimetry; she was well acquainted with the difficulties of measuring fields of vision in the neurasthenic, the half-blind, in those who had not central fixation and in patients who had insular scotomata

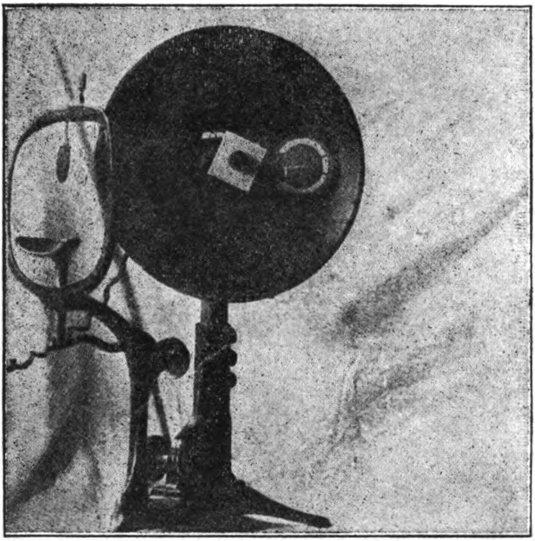

Fig. 1. Ophthalmometer showing square white card over end of telescope tube emphasizing line of gaze.

or quadrant hemiopias. As a matter of fact, this lay assistant was really more competent to measure each variety of form-and-color field than is the average ophthalmologist. The consequence was that measuring the field of vision (which in most cases requires uninterrupted and patient mental concentration for at least a half hour) was done in every necessary instance as a daily routine measure—a task very likely to be neglected or carried out in a hurried or perfunctory manner when it is the task of the ophthalmologist himself. —Ed.]

The Porges Reaction in Ophthalmology. F. Sunseri[6] describes a series of cases in which both the Porges reaction and the Wassermann reaction were simultaneously tested in various ophthalmic patients, both syphilitic and non-syphilitic. The Porges reaction is one of several tests of the precipitin class which it is hoped may be found sufficiently trustworthy to be substituted for the more costly and lengthened Wassermann.

The *technique* employed is as follows:—A fresh solution of 1 per cent. sodium glycocholate (Merck) in distilled water is mixed with an equal volume of the suspected serum, which should be clear and previously kept for one half hour at a temperature of 58° C. The quantity used was generally 1 c.c., but the test can be adequately performed with 0.20 c.c. The tube is kept at the room temperature for from 16 to 24 hours. The formation of a flocculent precipitate constitutes a positive reaction. As control a known syphilitic serum may be employed.

The reaction has been supposed to depend on the greater ease with which the albuminoid substances are precipitated in syphilitics (it is to be noted that a complete precipitation takes place with normal serum after 48 hours), and also to the quantity of albuminoid substances circulating in the blood of syphilitics being greater than that in healthy individuals.

The only non-syphilitic serum that gave a positive reaction in Sunseri's list was one derived from a case of Malta fever. Sunseri expresses his confidence in the clinical trustworthiness of the test.

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(6) Ann. di Ottalm., February, 1917.

HYGIENE OF THE EYE.

State Examinations and Treatment for Eye Disease in School Children. A practical and timely essay on this subject has been published by A. Rovinsky.[7] He begins with the assumption that the state, having recognized compulsory elementary education as a social necessity, should logically conserve in the most efficient way possible the health of the school child on the principle that public education and public health are indissolubly connected and practically interdependent, and that it is only the healthy child who profits fully by the advantages of free education.

Medical school inspection is but a manifestation of the spirit of the enlarged activity of the state on behalf of the growing generation, the very basis of our social fabric, and though barely fifteen or twenty years old, and as yet not mandatory by law either in part or as a whole in many a state, it bids fair to become possibly the most important integral part of the subject of general school hygiene. While originally the chief and only aim of medical school inspection was—and is in so many localities even now—the detection and prevention of communicable diseases to control their spread to other school children, the field was gradually enlarged, until it now embraces, in addition, the detection of preventable illness due to any remediable physical defect by complete physical examination of the school child, so far as it can be made amid school surroundings, and notification to the parents of the discovered defects, with urgent advice to institute treatment. To do this properly a school clinic as an integral part of the school system should be established to remove from this method the stigma of charity, which keeps many a poor deserving person from applying for treatment at many dispensaries. Such a clinic is a necessity even in large centers like New York or Philadelphia that are well supplied with eye clinics.

It is unfortunate that the anarchy that is so characteristic of all our dispensary work—overworked assist-

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(7) New York Med. Jour., Nov. 24, 1917.

ants, crowds of patients, lack of system and order, enormous waste of clinical material—leads invariably to slipshod work that is especially unproductive when applied to refraction, a rather exacting, painstaking, and time consuming procedure. Surely opticians and optometrists, whose training hardly fits them for the examination of the children's eyes, can not be expected to refract them properly; or shall we leave the child to the street peddler, or the grandfather who will often saddle the child with his own spectacles, as was proudly exhibited by several children at school? Though the majority of children who need glasses and are unable to get them obtain them through various relief organizations of the city, "there are a considerable number of cases where the child presents a certificate from private physicians or dispensaries stating that the child is under treatment for defective vision, but no evidence other than some form of 'eye lotion' or 'eye drops' has been prescribed. . . . The department has no legal authority to demand that glasses should be provided in these cases; it accepts only at its face value the evidence that the other treatment has been obtained." Such a clinic, which is both a diagnosis and a treatment clinic, may either be a separate clinic by itself, a part of the school building, or by arrangement with a hospital, a part of the outpatient department of the same. In this clinic a definite diagnosis of the eye defect as first pointed out by the school physician or the teacher is made, and proper treatment instituted.

The chief value of the school eye clinic lies in its diagnosis and treatment of the errors of refraction as found in school children, namely, the prescribing and supplying of glasses to children who are unable to obtain them for themselves. While the establishment of such clinics may encounter opposition on the part of the public as well as of a certain element of the profession, it can not be too often repeated that it is little less than a crime to permit a neglected curable defect in a child to interfere with his education and practically with his entire future efficiency; the state supplies the school child with free text books, why not with free glasses?

Assuming that most of the parents will resort to the free treatment—which, by the way, is far from the case—the self-respecting poor will in the majority of cases scrape together enough to pay the nominal cost of glasses, while the absolutely indigent will be aided in the only place and manner where such an aid can be given them as their social due. Besides, as Lewis Williams says: "Inasmuch as those very diseases which chiefly affect school children and play such havoc with school efficiency and school attendance are the very ones most neglected by parents in spite of medical inspection, the school clinic plainly becomes the only method of dealing with the difficulty." After all, our chief aim in this matter is the improvement in the child's condition, the laying of the foundation of a healthy life, liberty, and the pursuit of happiness. Is this not a goal for the striving and attainment of which every honorable means is fully justified?

A short survey of the various eye affections occurring among school children will bring out the necessity for the school clinic. Rovinsky divides these affections into the three following groups: (1) the non-contagious eye affections; (2) the contagious eye diseases; (3) the refractive errors. This classification is purely arbitrary and is made from the point of view of diagnosis and treatment only.

Varieties of blepharitis and hordeolum demand the attention of the school physician only in so far as they, especially blepharitis, are too frequently local manifestations of a systemic disorder, such as general debility, or are due to exposure to wind or dust or indulgence in late hours, a not infrequent occurrence in school children in the large cities. Very often the condition is due to uncorrected refractive errors and chronic conjunctivitis. Treatment is directed to the underlying cause as well as to the local condition. A much more serious condition, happily not met with so frequently, is phlyctenular conjunctivitis, or keratoconjunctivitis. Here again, while the condition is a sign of scrofulous—tuberculous?—taint, the consequences of the lack of treatment, whether local or constitutional, may become serious enough to reduce greatly the acuity of vision. It is in such conditions that we must employ special aid in treating the school child, and it is here that the treatment clinic becomes important, for simple but properly directed treatment will safeguard the child's vision from any baneful sequeles. This is the more important as the disease has a tendency to recur, and unless combated with proper means is apt to injure vision permanently. Another and a most important member of this group is the so-called follicular conjunctivitis, or "folliculosis of school children." This comparatively innocent condition is often mistaken for trachoma, and while the differentiation between the two affections is frequently difficult, it is not impossible. The difficulty is the greater as follicular conjunctivitis is apt to be found in a number of children in the same class, thus simulating contagiousness. As a matter of fact it is not at all contagious, its prevalence being due, in addition to some predisposition on the part of the child, to vitiated air in defectively ventilated school rooms, to overexertion, general as well as ocular, and so on. This differentiation, however, is a matter of great importance in a school child, for once taken for trachoma the child is greatly inconvenienced by the treatment for this condition. Once recognized, the condition is readily controlled. The untreated cases are apt to become chronic, but are never followed by the sequeles so characteristic of trachoma. The school physician, if not an eye man himself, should refer the child for a definite diagnosis to the treatment clinic. The different varieties of ceratitis, especially the interstitial, and of corneal ulcers are rather infrequent and usually present such distinct symptoms that their recognition is not difficult, and treatment more or less satisfactory.

The two principal contagious eye diseases of school children are the acute epidemic conjunctivitis, "pink eye" (Koch-Weeks), and trachoma. We occasionally run across a pneumococcus conjunctivitis, the chronic Morax-Axenfeld type, or rarely the diphtheritic or gonorrheal type, but these are all comparatively rare. It is possible that if smears were made from every suspicious case we would find more of them than we find now. In epidemic conjunctivitis corroborative diagnosis by an eye man and treatment at a clinic are necessary, provided the parents are unable to procure private medical aid. It is frequently apt to be mistaken by the school physician who may overlook its contagious nature, put it down as an ordinary catarrhal conjunctivitis, and thus, instead of checking, assists in spreading it. In view of the general angry appearance of the eye—vivid, red, congested conjunctiva, swollen lids, mucopurulent secretion, etc.—the school physician may be inclined to atropinize it unnecessarily, even in the absence of any corneal invasion, thus adding to the trouble. A couple of weeks of proper treatment at the clinic will cure the condition, and on account of the connection between the clinic and the school, the situation will be controlled as far as the child's return to school is concerned. This is a matter of vital importance as regards school attendance, for frequently children absent themselves from school for prolonged periods because they were not informed as to when they might be safely readmitted.

As regards trachoma, the second and more important member of the contagious group, the experience of the Department of Health of the City of New York—a pioneer of the work in this country—is of sufficient importance to the point at issue, to dwell upon at some length. The department has combated trachoma and other conjunctival affections by establishing special "ophthalmia" classes and eye clinics where the children "may be kept under control, segregated, treated, and taught prophylactic hygiene." In New York in 1912 there were 700,000 school children, of whom 33,860 suffered from acute contagious conjunctivitis, and 15,245 from so-called trachoma, or granular lids. These children, most of whom were not excluded from school attendance, reported to the school nurse with a stamped note either from a doctor or from a clinic. As was to be expected, the children were not attended to properly for many and various reasons and those who were excluded, being permitted to roam about freely, would carry infection to all who came in contact with them, all the precautionary instructions notwithstanding. In

October, 1912, two experimental eye classes for children with contagious eye diseases were opened in connection with a health department eye clinic. During the three clinic days held in this building, children from sixty adjoining public and parochial schools are being instructed and when necessary treated and supplied with diagnosis cards for the information of the school nurse. Those retained in the special classes are treated according to the prescribed directions of the clinic doctor by the special nurse assigned to duty at the ophthalmia school; she also "teaches the children personal, family, and social hygiene by talks, demonstrations, and quizzes; demonstration on domestic hygiene and the care of the eyes is given to the mothers."

The clinic is conducted on aseptic and antiseptic principles, and all precautions are taken to avoid carrying infection from patient to patient. The nurse visits the homes of the children in attendance, and gives instruction to the mothers. In the school the children's eyes are protected from strain, all work as far as possible is oral, and reading and writing are of very short duration or omitted in severe cases. More stress is laid upon hygiene and the care of their health than on the three R's. Among the 312 pupils treated at the ophthalmia school for the school year 1912, there were cases of acute conjunctivitis, including acute contagious conjunctivitis, or "pink eye," and phlyctenular conjunctivitis; chronic conjunctivitis; "trachoma"; follicular conjunctivitis; syphilitic, tuberculous and phylctenular keratitis, and neglected protracted cases of blepharitis. Only three during the year returned to the class after discharge with a recurrence of the disease. The shortest stay in the class was two days; the longest stay among those with postoperative and cicatricial trachoma, and pannus or ulcers, was the entire school year of nine months. "From the point of view of educational authorities the child loses no school attendance, the principal is still in control, since the child is not excluded, the arm of the truant officer is still powerful, school discipline is not relaxed, and the child is not thrust out into the streets to become more familiar with bad company and bad habits. From the health point of view, the disease is attacked early and prevented from becoming chronic, kept under persistent treatment so that the cure is shortened, and at the same time both child and parent taught how to avoid reinfection and spreading the disease to others.

"At the same time an infectious eye disease clinic, of which the department has at present eight, was opened. This clinic is held twice a week, and children in groups come from neighboring schools to receive a certain line of prescribed treatment; if they show secretion 'they are placed in a regular classroom at a desk somewhat apart from the other children. Directions are given to the child and the teacher how to avoid spreading the contagion. The chair and the desk which the child occupies are washed with antiseptic solutions after school. The banisters leading to the clinic room are washed daily with an antiseptic after each clinic is held. In spite of the fact that the school takes care of about 2,500 children and is not kept any cleaner than the average public school in New York, with the exception of the clinic room which is mopped up daily, we have had very few acute cases during the past two years. We have never traced an infection carried from one child to another in the classroom.' During 1914 13,301 cases were registered in the refraction service, on 24,722 refractions were performed, and 10,465 contagious eye disease cases received 69,260 treatments."

By far the largest number of ocular defects met with in school children is made up of the various refractive errors—hyperopia, myopia, and astigmatism—running from 10 to 30 per cent. of children examined. Thus W. B. Drummond finds 10 per cent. in Scotland; the New York City Department of Health *Bulletin* states that out of 240,000 school children examined during 1916, 23,432 were found to have defective vision; Terman gives 19.1 per cent. in Worcester, 20.7 per cent. in Cleveland, 22.3 per cent. in Massachusetts, 30 per cent. in Minneapolis, 30 per cent. in Minnesota.

This is neither the place nor the time to enter into a full discussion of the etiology of refractive errors in school children and the far reaching consequences resulting from neglect of their treatment. This subject has been exploited by prominent scientists, especially since the day when Herman Cohn, in 1867, and later Risley, in 1881, published the results of his epoch making examinations of 10,000 school children's eyes, wherein he proved beyond doubt not only that a hitherto unsuspected great number of cases of myopia exists in school children, but that their number tends to grow as they advance with higher classes, and are to be found in greater number in city schools, as compared with the country. It has been conclusively established that the child on entering school is usually hyperopic; in fact, hyperopia is practically the normal condition at birth. This changes to emmetropia in some cases and then under the stress of school conditions into myopia, or directly, as some think, through astigmatism. The compilation made by Randall, which covers 200,000 eyes, shows hypermetropia to be by far the prevailing refraction in childhood and in early youth. His table illustrates the law of decreasing hyperopia as the eye evolves:

RESULT FROM THE GYMNASIUM AT ALTOONA.

Age.	Percentage of hyperopes.
9-11	18.93
12-14	7.14
15-17	6.88
18-20	4.5
21-22	0.0

Myopia, on the other hand, is almost unknown in the early days of school life, becomes more frequent in the course of school days, and reaches a deplorable height in higher schools. The following table shows the increase of myopia:

Age.	8	9	10	11	12	13	14	15	16	17	20
Erisman	10.2	14	13	20.6	21.2	28.6	32.6	43.2	40.4	47.2	50
Derby	3.55	..	5	...	10	...	...	15	...	...	..

While hyperopia, meaning the astigmatic varieties of the error as well as the simple hyperopia, is prevalent among school children and is followed by the usual train of asthenopic symptoms, such as headache, pain in the orbits, congested eyelids, blepharitis, and so on, by far the more important refractive error is myopia. Myopia has been found among those who have never attended school or engaged in any near work, such as agricultural workers; nor is the school considered by some as the only or the chief cause of myopia. Some even believe in a hereditary tendency in myopia, such as conformation of bony orbit or a low orbit predisposing to that refractive error. Again, there is a tendency to place high myopia, with its distinct pathologic changes, in a class by itself, as distinguished from low, or functional, myopia. Though a change has been noted of late in the view of the causation and prevalence of myopia, the prevailing opinion is today as it was forty or fifty years ago, that school myopia is not only a refractive error, but often a disease and a very serious one. In the medium and especially in the high degrees it is attended by a long train of symptoms from eye fatigue, orbital pain, and *muscae volitantes* to divergent squint, sclero-chorioiditis myopica, detachment of the retina, and eventual loss of vision. It is now believed that the conditions of school life, such as insufficient and badly placed lighting, bad seating, poor type in books, excessive home work, a certain style of writing—in short, all causes that tend to induce fatigue of the accommodative, as well as the external ocular, muscles, accentuate its development, and perpetuate its existence and increase. What is probably most important of all, an increase of myopia in the older child is undoubtedly due to the failure to detect and correct it in earlier life. This is where the school clinic comes so prominently into play. No parent, however opposed to reason, would not recognize the necessity of refracting his child's eyes, especially if myopic, and of fitting him with the proper glasses, if all the consequences of a neglected myopia are fully explained to him. A myopic eye is literally a stretched eye, and it requires no special knowledge to appreciate the fact that a tissue, particularly that of a growing child, when stretched becomes weaker than it was before, and with the increase of myopia, this stretching process goes on more and more, until tears and breaks in the envelope of the eye cause irreparable damage, to be followed in many cases by incurable blindness. That the early effective correction of myopia in a specially conducted school clinic has contributed to the diminution of myopia has been proved by many investigators. Among them can be cited S. D. Risley and his assistants, who reviewed 195,000 prescriptions for glasses written over the period from 1874 to 1893. There was found to be a steady decline in the number of prescriptions written for the correction of myopia. Quoting briefly without fractional exactness, in the year 1877 27 per cent. of all prescriptions were for myopia; 20 per cent. in 1885, and 16 per cent. in 1893.

While examination of the acuity of vision in school children may be entrusted to the teacher who has mastered the simple technique of the Snellen test card, the results are to be taken guardedly. This refers especially to cases of low hyperopic astigmatism, where the children may have 20/20 or even 20/15 vision, and still suffer from pronounced asthenopic symptoms such as headache, blurred near vision, general indisposition, etc. It is just these cases of low refractive error in which normal vision is obtained at the expense of considerable nervous tension, in which the correction of the error, always under atropine, yields such brilliant results. The teacher should be instructed to be on guard to differentiate between cases of normal vision with or without symptoms of latent hypermetropia. It will be noticed that such children hold the head too near the book, less than twelve or fourteen inches, will frequently complain of headache, and will show signs of temporary deviation. As is well known, neglected hyperopia is the basis of internal, or convergent, squint, which constitutes from 90 to 95 per cent. of all squints; the rest are due to external strabismus, usually caused by myopia. We are considering here the non-paralytic, or concomitant, variety only and are omitting cases due to acquired amblyopia as due to corneal opacities, and other causes, as well as the rather rare cases of upward and downward squint. The strong effort of accommodation combined with the act of convergence made by the defective hyperopic eye, causes fatigue of the ocular muscles until the stronger overpowers the weaker muscle, and the eye turns in the direction of the stronger muscle. The early resulting diplopia is gradually overcome by the suppression of the indistinct image. The tendency to squint appears as early as the third or fourth year, and if detected its correction with glasses can be effected early enough to avoid prolonged atropinization or occluding the fixing eye or training the fusion sense, a long and tedious process under the best of circumstances, and eventually an operation, the child meanwhile suffering from a gradual impairment of vision, not to speak of the disfigurement. According to Hoag, squint can be detected in about 2 per cent. of school enrollment by means of ordinary observation. Cornell estimates that it is present in from 3 to 6 per cent., while Butterworth finds that it ranges around 2 per cent. Thus the careful examiner can detect the condition even in the early stages, when the correction of the refractive error will result in a cure. Once the condition becomes firmly established, the impairment of vision is marked and frequently irreparable, and operation has often to be resorted to for cosmetic reasons only. It is here that the school clinic looms up as the agency whereby early and successful interference will be attended by preservation of the child's vision.

Rovinsky concludes as follows:

1. The rôle of the eye in the human economy is so great and its importance in the earning capacity of the individual is so essential that no means should be spared by the state to conserve vision from the earliest childhood.

2. As irreparable deterioration of vision is apt to result from ocular affections that may not appear serious even to the medical man not specially trained in ophthalmology, such as maculae or leukomata centrally located consequent upon the several varieties of keratitis, corneal ulcers, etc., the early recognition of such conditions in school children is most imperative, and it devolves on the state to render proper and timely aid in detecting and treating such affections whenever the parents are unable to obtain such aid themselves.

3. The establishment of school eye clinics should be considered as a part of the system of medical school

inspection, their number to conform to the needs of the surrounding neighborhood.

4. As regards contagious eye diseases, it should be made obligatory upon the parents of public, parochial, and private school children to resort to these school clinics for diagnosis and treatment until the condition is cured and the child readmitted to school, unless they present sufficient evidence that their children are being treated by private physicians.

5. Instead of resorting to private charitable agencies to procure eye-glasses for children who need them but are unable to obtain them, it should be the business of the clinic to supply the children with glasses either at nominal cost by arrangement with competent opticians, or free of charge.

[As the writer does not refer to the elaborate monographs of Frank Allport of Chicago on this subject, it is well at this time to draw the attention of the reader to the 1917 numbers of *Ophthalmology,* in which every aspect of the hygiene of the eye, particularly in its relation to school children, is treated. All the legislative and other acts relating to this important matter are carefully considered in that periodical.—Ed.]

The Effects of Cinematograph Displays On the Eyes of Children. The direct effects of moving pictures upon the eyes, ignoring indirect effects such as may arise from excitement, injurious atmosphere and fatigue of late hours, are discussed by B. N. Harman.[8] In general, the effects in the eyes of children are the same as those experienced by adults. The unpleasant effects associated with the cinematograph exhibition, so far as they affect the eyes, are due to the following conditions: (1) Glare; (2) flicker; (3) rapidity of motion; (4) concentration of attention; (5) duration of exhibition. None of these conditions are natural, some are peculiar to moving pictures, some occur with other optical exhibitions.

Regarding the glare, Harman says that though the human eye has a wonderful power of adapting itself to varying conditions of illumination, it is well nigh incapable of adapting itself to a single light in a dark

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(8) Brit. Med. Jour., Feb. 17, 1917.

place. The light may be feeble, but if the space in which it is exhibited be dark, it will be relatively intense, and therefore irritating to the eyes.

The flicker is peculiarly irritating and is of two kinds: First there is the effect of the rapid change of the moving film which is appreciated more by sensitive people whose "reaction time" is high than by those whose senses are duller. The effect is irritating according to the slowness of the flicker—the more rapid the change of the film, the less is the effect upon the eye. If the film can move at a rate slightly greater than that at which the keen eye is able to perceive variations of light, this sort of flicker will cease to worry. The defect is most evident now in the colored films, where attempts are made to give a natural color to the scenes by the rapid alternation of different colored films. The second kind of flicker is due to bad films having scratches and patches which allow sudden exposure of the eyes to bright flashes of light.

Undue rapidity of motion is another cause of fatigue. With the intent to reduce flicker, films are moved through the machine at a rate greater than the natural rate of progress of events depicted. The eye has a habit of work, just as any other part of the body or the whole organism, and there is a resentment expressed in terms of fatigue when it is required to work at a rate different to the habitual rate.

The concentration of effort constituting an hour's work is considered an additional reason for fatigue especially since there is no adjuvant sound or other points to divide the attention, the eye being compelled to be fully alert and constantly varying its condition according to the changes in illumination of the screen.

Finally, Harman considers the duration of these shows sufficient to induce nerve exhaustion.

All of these ill-effects are reduced when the observer is as nearly as possible in a line with the center of the screen and as far away from the screen as thrice its full height.

He admits that it is difficult to answer the question whether permanent defect arises from attendance at these shows especially by figures and percentages. But he thinks a recent observation has some bearing on the case: The examination of the case papers of a large number of school children, who have been referred to eye clinics on account of failure to pass the standard vision tests at the schools, shows that there is an increasing number of children who on examination at the clinic are found to have nothing the matter with them. This is probably caused by a condition of fatigue in the children so that at the time of the test they were incapable of putting out sufficient energy, either ocular or mental, to read the standard types. Many of the children are in the habit of going to moving picture shows.

The following recommendations are made for the better protection of children: (1) The reasonable illumination of all parts of the hall not directly beside the screen. (2) The improvement of the movement of the film so as to reduce flicker, and the withdrawal of films immediately they are damaged. (3) An improvement in taking the picture so as to bring the rate of motion of the objects depicted more nearly to the natural. (4) The increase in the number of intervals in the show, and the interposition of exhibitions other than that of the optical lantern. (5) The limitation of shows for children to one hour, and the prohibition of "repeats." (6) The reservation of the children's seats to the "optimum" position in the hall. With such provisions the indulgence in a show once a week should do no harm to the eyes of a normal child.

The Occurrence of Ocular Defects and Diseases at the Massachusetts State Reformatory for Women. The following report by L. W. Jessaman(9) has to do with the occurrence of ocular defects and diseases among 438 women.

The author concludes that: Ocular defects may be considered a contributing factor in causing delinquency in some cases, but the percentage is small. Defective vision does not seem to play a very important rôle in causing mental deficiency among the inmates of the Sherborn Reformatory. A very large percentage of the inmates require attention for correction of refractive errors or treatment of ocular diseases. Abnormalities of the eyes should be remedied so far as possible, as thereby the individual is better prepared to do her share of work at the reformatory, and, what is more important, she may care for herself better when she is sent out into the community.

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(9) Ophth. Record, April, 1917.

Care of the Eyes of the Patient During Etherization. It is fortunate, says A. H. Miller,[1] that conjunctivitis is an infrequent post-anesthetic complication as, when it occurs, the pain resulting from the conjunctivitis is likely to be so severe as to outweigh any other discomfort that may follow the operation. Conjunctivitis is supposed to follow exposure of the eyes to ether vapor, or to result from the spilling of the liquid anesthetic on them. In the anesthetic literature, mention of this question is limited to directions for covering the eyes with a towel, gauze handkerchief, or a strip of rubber tissue for the purpose of protection from the anesthetic vapor. In cases in which these precautions have been carefully taken, conjunctivitis occasionally develops. In a series of 3,000 cases of ether anesthesia by the open method in which the eyes were not covered, although they were exposed to the ether vapor and although liquid ether was without doubt accidentally spilled over the eyes in some cases, no conjunctivitis has occurred.

If the anesthetist allows a drop of liquid ether to be placed in his own eye, no severe reaction follows. Ethyl chloride is equally harmless to the eye. If a quantity of liquid ether is accidentally spilled over the uncovered but closed eyes of the anesthetized patient, conjunctivitis does not usually follow. When the towel or gauze covering the eyes becomes saturated with ether and remains in this condition, a severe conjunctivitis will probably result. In case the patient's eyes do not completely close during anesthesia, or are held open by a carelessly applied protective covering, conjunctivitis is very likely to occur. There can be no doubt that the precautions usually taken to avoid post-anesthetic conjunctivitis in reality increase the danger and often are the sole cause of the trouble.

The only conclusion to be drawn is that, during general anesthesia, the eyes should not be covered. If

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(1) Jour. Amer. Med. Ass'n., Jan. 12, 1918.

liquid ether is accidentally spilled over the eyes, they may be washed with saline solution or sterile water, or the lids may be carefully dried with soft gauze. The lids should be closed during anesthesia. In the cases in which there is tendency for them to remain open, they should be frequently closed with the tip of the finger. The lid reflex may be frequently tested with the finger tip and at the same time the condition of the pupil noted. The unclean and unnecessary practice of touching the conjunctiva to elicit the corneal reflex should rarely if ever be indulged in. By this simple technique, the eyes may be safeguarded during general anesthesia.

The Education of the Blind in Germany. A. Bielschowsky[2] reports that of 40,000 blind people in Germany before the war, only 0.2 per cent. belonged to the class with university education. But since the war the number of blind people with academic ambitions has increased so much that it has been necessary to create facilities in order to satisfy a real want. A society was formed called "University Library, College, and Advisory Board for Blind Students." Committees were established for the task of elaborating the best type of blind script for scientific works and of deciding on standard text books in the various faculties. In many towns, associations were formed for the training of voluntary workers, mostly female, for the production of library books in blind script. The advisory board gives information and help to blind students and blind professional men all over Germany. In Marburg, a small university town, a college for the blind has now been opened with resident as well as non-resident students. There were seventeen students during the first term. The teaching staff includes three blind tutors, a theologian, a philologist, and a jurist. The building is situated near the university, surrounded by a garden, and contains workrooms for a bookbinder, a printer, and twenty-one living rooms, of which seven are allotted to resident students.

[It will, the Editor feels certain, be a matter of grati-

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(2) Die Forderung des akad. Blindenbildungs gewesene im Kriege, 1917.

fication to the reader when he learns that United States General Hospital Number Seven, Baltimore, Md., has been set aside by the Surgeon General for the treatment and subsequent re-education of our war blinded men.

This institution will be under the care of Major James Bordley, Jr., assisted by a trained corps of teachers of the blind. Already a number of blinded soldiers are in this hospital, receiving the same kind of care given the British and Canadians in the hospitals so wonderfully managed by Sir Arthur Pearson, at St. Dunstan's, Regent's Park, London.—Ed.]

Some Eccentricities of Indian Ophthalmic Practice. R. H. Elliot's[3] long practice in India has enabled him to describe from personal observation some of the curious and appalling practices common among the native *savants.* These are particularly interesting as a portrayal of the superstition and ignorance with which Western science has to deal in the East. In speaking of the diverse remedies used by native women in the treatment of the enormously prevalent conjunctival disorders, he mentions human milk, which, especially when squirted into the eye straight from the breast, has a high reputation for healing power. The quintessence of danger is found in the "laboratories" of the amateur village expert who is usually an ignorant old woman, possessed of a dark fatalism and a confidence unshaken by failures. Here are prepared the pastes or powders of the specialist, the common ingredients of which are the juice of the leaves of the tamarind tree (which is very acid and irritating), the juice of fresh limes, alum, various kinds of pepper, iron filings, human milk, human urine, cow dung and many other substances. The author says it is not difficult to imagine the harm which can be done to an eye suffering from conjunctivitis by inserting into the conjunctival sac one of these irritating concoctions. A favorite and a very evil native practice is to introduce one of these preparations into the conjunctival sac of a comatose patient, the object being to restore him to consciousness by this drastic means; as a result the cornea is frequently severely damaged.

The writer points out that the ulceration and conse-

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(3) Brit. Jour. Ophth., February, 1917.

quent leukomata of the cornea dating from an old attack of smallpox, very often may be attributed not to local pustules but to the results of exposure, the patient having been allowed to remain on the floor of a dusty mud hut for hours or even days, in muttering delirium or coma, exposed to desiccating influences of wind, dust and heat and the insults of flying creatures. The vaidyan sometimes uses a variety of drops; some are very irritating while others owe their potency for mischief to contained organisms. He mentions one case, a highly educated Burman, who was advised to wash his eyes in human urine, and as a result lost his sight thereby, his urine having contained gonococci. Many of the midwives, the writer has been told, make a habit of washing the infant's eyes in the mother's urine immediately after birth. Granular ophthalmia is frequently treated by irritating powders and actual cauterization, resulting in deep scars.

Elliot tells of the humorous practice of recommending that an eye disease should be treated by rubbing the sole of the corresponding foot with medicated oil (with the idea of bringing "down the heat from the head"), or by getting a friend to chew raw onions and with his mouth full of the half masticated mass, to blow on the affected eye.

Most educated Indians have their horoscope cast and consult an astrologer before entering upon an operation. In order to keep the patient's confidence, the ophthalmic surgeon often must see that the astrologer fixes as a favorable time for operation that most convenient to the surgeon.

REFRACTION.

Cause and Treatment of Stationary Myopia. High, progressive myopia, which he considers as a disease of the eye, is distinguished by W. Koster[4] from stationary myopia. He propounds his views on the latter with the following conclusions:

The myopia occurring in eyes affected with maculae cornea, and especially the renewed progression of it

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(4) Zeitschr. f. Augenhlk., vol. 34, p. 225.

under the influence of full correction, proves that the strain of accommodation is the factor in the development of this anomaly of refraction.

In near work the external muscular pressure, or the too great convergence in peculiar structures of the skull, or the absolute or relative shortness of the optic nerve, can exert only a minor detrimental influence.

The over-strain of accommodation does not act through accommodative or post-accommodative increase of intraocular tension.

Precursors of stationary myopia are a slight decrease of the light sense and central vision with dilatation of the pupil. Then follow venous hyperemia of the fundus and the development of a temporal crescent at the disc. These symptoms are produced by a benign chorioretinitis.

The stationary myopia does not primarily develop in consequence of a normal though too long continued accommodation, but especially by an over-strain of accommodation by approaching the work too close to the eyes on account of diminished visual acuity and light sense.

The venous congestion of the posterior segment of the globe is caused by the excessive or too long prolonged traction of the ciliary muscle at the vortex veins, by which, especially in the branches turning backward, the outflow is impeded by a kind of kinking.

In consequence of the venous stasis in the posterior segment of the eyeball the sclera at the posterior pole grows less resistant and gives way to the normal intraocular pressure.

The myopic crescent is not created by the ciliary muscle pulling on the chorioid, for then it would be at first visible at the nasal side of the disc. It is the expression of a process of retraction in the posterior half of the uvea. Only in latter stages of myopia it may become larger by too great distension of the sclera at the posterior pole. This retraction must be explained from the chronic stasis, especially in a chorioid already diseased.

The treatment of stationary myopia must as early as possible aim at curing the underlying chorioretinitis. The radiation with radium and mesothorium seem to promise good results. Further the over-strain of accommodation must be combated, even by ordination of convex glasses for near work, when necessary.

The hypermetrope accommodates less intensely than candidates of myopia who work at close range. In hypermetropia, no congenital weakness of the sclera exists which often promotes the development of myopia.

With the growth of the normal hypermetropic eye of the child the refraction of the lens constantly decreases considerably, which by the growth of the eye in the direction of the optic axis is constantly neutralized, while the increase of the size of the cornea, and a diminution of refraction, subsequent to it, is relatively very slight.

In hypermetropia also a venous congestion of the posterior segment of the eye from the influence of the excessive accommodation exists and in the same fashion as in the development of the stationary myopia acts in the sense of the prolongation of the ocular axis. By this every hypermetropic eye is led into the direction of emmetropia. If this is reached, the refraction becomes stationary, just as it happens in school myopia, if no further over-strain of accommodation takes place.

If the chorioretinitis in stationary myopia is healed, which becomes apparent by better light sense and good vision, there is no reason to withhold from the patients full correction also for near work, but only under the condition that they read at one-third of a meter. For long-continued work it is always better to prescribe weaker glasses.

High Refractive Errors Among School Children. As ophthalmologist to the Philadelphia Bureau of Health, L. C. Wessels[5] has refracted some 20,000 children. He found in one family of six children that each had hyperopia of not less than fourteen and not more than eighteen dioptries. He saw one family of myopes (colored) where the youngest of 6 years with six diopters of myopia and two of astigmatism and the oldest of 8 years had seventeen of myopia and three of astigmatism. The two children between having myopic errors above eleven diopters. The highest myopia he saw was in a child of 14 years who was wearing—27.00—4.00 ax. 180. The

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(5) Jour. Ophth., Otol. and Laryngol., March, 1917.

seriousness of myopia in school children is not appreciated by our educational authorities. Close work should be reduced to a minimum and all home work and reading at night should be forbidden. The teaching of myopic children should be oral and their training vocational and manual, such books as are indispensible should be printed in large type on a mat surface. Special classes should be established for the teaching of myopic children. The regular classes are detrimental to the child's future; it would be better to take it out of school rather than to jeopardize its sight. Myopic children, as a rule, are good scholars, because of being deprived of the health-producing sports by poor vision. They have no difficulty at the near point, hence their enjoyment is in books. Many of them will not wear their glasses. If a child will wear its glasses constantly before the myopia has progressed, progression is often prevented. Special classes for the teaching of myopic children or those suffering from other high grade refractive errors are more important than special classes for the teaching of the mentally defective.

Rules for the Correction of Astigmatism. Although the question, whether in a given case the astigmatism of an eye should be corrected or not, occurs daily it has been little debated in ophthalmic literature and directions on the subject in text-books are vague. Consequently, J. W. Nordenson[6] ventures to review shortly the rules concerning this subject.

He thinks that when correction improves visual acuity, it is advisable when there is need of accurate detail-vision, and points out that, although a visual acuity considerably below normal is sufficient for most occupations, yet, the more accurate the visual perceptions are the better. Accommodation asthenopia is also mentioned as an indication for correction—some ametropes, in order to improve definition, accommodate in excess of what gives the proper focal distance; this spoils definition; therefore the patient relaxes accommodation, the pupil widens and he reverts to accommodation. Such an alternation where long-continued produces strain. Asthenopia, due to strain of the orbicularis muscle, pro-

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(6) British Jour. Ophth., March, 1918.

duced by its efforts to correct astigmatism by exerting pressure in a vertical direction on the globe, may constitute an urgent need for cylindrical glasses, likewise that form commonly thought to be a cause of nervous troubles. The writer advises the correction of astigmatism when strabismus is imminent, since it is often due to the fact that the faculty of fusion is strained at the time the desire for single vision is diminished, as when one eye has less sharp retinal images than the other; the defective eye, in which the images have been suppressed, is then left to take the position most convenient to its muscles.

As contraindications to correction Nordenson includes: the inconvenience of wearing glasses, as when one eye is normal and the other, astigmatic; the non-improvement of visual acuity after the use of glasses for some time; and also intolerance of correction, which at times can not be overcome in elderly patients in whose eyes the axes of the optical system do not coincide with the vertical and horizontal plane; such patients being accustomed to distorted images and often continuing to misinterpret the correct retinal images after correction, should be given a weak cylinder first. Nordenson, in referring to the article by Lagrange in which the correction of hypermetropic astigmatism so often found in children is not advised unless it be causing trouble, points out that the possibility of self-cure by leaving the astigmatism uncorrected is insufficient to contraindicate correction in these cases. In conclusion he mentions the fact that the above indications and contraindications do not exhaust the list but must be weighed one against the other according to the individual needs of every case.

The Use of Cycloplegics in Refraction Work. It would seem unnecessary to expatiate on the *importance of the employment of cycloplegics* in estimating refraction, but for the late contrary view expounded every now and then. Ernest Clarke[7] believes that anyone who states that a cycloplegic is never necessary does not appreciate the very essentials of the question of eyestrain; in the absence of a cycloplegic, a different result

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(7) Med. Press, Feb. 21, 1917.

can be obtained every time the refraction is tested and it is impossible to determine accurately the exact amount or axis of a low power cylinder. To prove his statements, the author has carefully worked out the refraction of many young patients before and after a cycloplegic was used; in no single case did the post-cycloplegic correction tally with the preliminary test. He maintains that though large errors take care of themselves, the careless correction of such errors resulting in the prescribing of glasses which are very nearly, but not quite right, is liable to induce eye-strain which perhaps never existed before, because the ciliary muscle is now able to correct the small deficiency that is left, whereas it could not deal with the larger error. He fears that many ophthalmic surgeons omit the cycloplegic because they will not take the necessary trouble and although they spend hours over an obscure form of retinal disease which they can not alleviate, they fail to appreciate that with a little extra care and time with their refraction cases they can turn a life of misery into one of comparative happiness.

Combined Use of Cross Cylinder and Astigmatic Dial. The cross cylinder is at times found to be misleading and uncertain; this being seldom the case as regards determination of the axis, but more frequently so concerning the strength of cylinder required. Wm. H. Crisp[8] thinks this is explained as follows: Since letters arranged in horizontal series or lines tend to appear to blend more or less with one another when elongated horizontally, and to be more separated from one another when elongated vertically, many patients are disposed to select as clearer that position of the cross cylinder in which the vertical elongation occurs. This position is the one in which the effect is that of a plus cylinder held with its axis more or less horizontally, or what amounts to the same thing, of a minus cylinder held vertically. It is less likely to arise with a patient fully under a cycloplegic. When encountered we have the effect of a reduction in the apparent amount of direct astigmatism present, or an increase in the inverse astigmatism. After arriving at an approximate estima-

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(8) Ann. Ophth., January, 1917.

tion of the spheric correction, Crisp places the ordinary clock dial before the patient and asks which line is most distinct and then rather quickly reaches an approximation of the strength of the cylinder. He then uses the cross cylinder to obtain an exact placing of the axis. Then with the Thomas astigmatic chart the principal meridians are exactly estimated. In many instances, after preliminary use of the retinoscope, the Thomas revolving chart is the only one resorted to.

BACTERIOLOGY OF THE EYE.

Some Local Bacteriologic Findings in Conjunctivitis. The bacterial findings in conjunctivitis differ greatly in different regions, and it is in recognition of this fact that Roy R. Metz[9] has made observations in Cleveland and contrasts them with similar data from certain other localities.

During this series of examinations no epidemic of conjunctivitis occurred. There were observed *197 cases of acute and chronic conjunctivitis.* The secretions from 106 of these cases, or in about 54 per cent., were negative bacteriologically, or contained only those organisms found in nearly every normal conjunctival sac. Twenty-three cases in which the *Staphylococcus aureus* was found, and one in which the *Staphylococcus citreus* was present, are included among the negatives cases, because it has not been proven that the staphylococcus produces conjunctivitis. In man, all experiments for producing conjunctivitis by rubbing virulent *Staphylococcus aureus* into the intact conjunctival sac have failed. Two cases in which the *Micrococcus catarrhalis* was found are also included among the negative cases, because this organism has not been proven to cause inflammation of the conjunctiva.

The number of cases the secretion from which was bacteriologically positive was ninety-one, or about 46 per cent. The organisms which are reported as having been found in these cases were present either in pure culture, or if the infection was a mixed one, the organism re-

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(9) Ohio State Med. Jour., October, 1917.

ported was the one which predominated, or which appeared to be the most important.

The *Morax-Axenfeld diplobacillus* was found in thirty-seven cases, or about 41 per cent., while the Koch-Weeks bacillus was present in but two cases, or 2.2 per cent. Thus in the absence of an epidemic of contagious conjunctivitis, the diplobacillus is frequently encountered in Cleveland, while the Koch-Weeks bacillus is a very rare finding. Both the diplobacillus and the Koch-Weeks bacillus are widespread over the earth, but their distribution is very far from an even one, and to this irregularity of distribution considerable interest is attached. There is also a very great geographical irregularity in the comparative frequency of occurrence of the *Diplobacillus conjunctivitis* and of the *Koch-Weeks Bacillus conjunctivitis. In some districts Diplobacillus conjunctivitis is relatively frequent while that due to the Koch-Weeks bacillus is scarcely known.* In other sections of the same country Koch-Weeks conjunctivitis is frequently met, while the Morax-Axenfeld form is less commonly seen. In this country in New York City conjunctivitis due to a Koch-Weeks infection is frequent, while that due to the Morax-Axenfeld diplobacillus is uncommon. Of eighty cases of conjunctivitis occurring in New York City which were bacteriologically positive, the Koch-Weeks bacillus occurred in over 56 per cent., and the diplobacillus in but slightly over 6 per cent. From Philadelphia and Chicago have been reported findings quite the opposite to those reported from New York. In those cities the diplobacillus form of conjunctivitis seems to be common, while that due to the Koch-Weeks bacillus is a rarity. In Omaha it has been found that the Koch-Weeks bacillus does not occur, but the diplobacillus is encountered. In Toledo, Snyder found the Koch-Weeks bacillus but once in 203 cases of conjunctivitis examined bacteriologically, and observed the diplobacillus in three cases of this series.

In Canada, the *diplobacillus form of conjunctivitis* was observed 1015 times in Montreal during the past few years, while the Koch-Weeks type was met but ten times.

The association of the Koch-Weeks bacillus with conjunctivitis is common in Paris. In Glasgow the Koch-Weeks bacillus was associated with over 66 per cent. of 287 cases of conjunctivitis which were bacteriologically positive, while the diplobacillus was found in about 20 per cent. The Koch-Weeks infection was observed in 47 per cent. of 664 bacteriologically positive cases of conjunctivitis occurring in Aberdeen and the diplobacillus in 41 per cent. In other parts of Europe the conditions are reversed and the Morax-Axenfeld organism is that most commonly found. Of 622 cases of conjunctivitis occurring in Freiburg as the result of a bacterial infection, 83 per cent. was due to the diplobacillus, while but 7 per cent. was occasioned by the Koch-Weeks bacillus. The diplobacillus infection was observed in Lausanne in 66 per cent. of 281 cases in which causal organisms were found, while the Koch-Weeks organism was present in but 8 per cent. The Koch-Weeks conjunctivitis is met only very exceptionally or not at all in Marburg, Breslau, Rostock, Vienna, Wurzburg and Copenhagen; while that due to the diplobacillus is not uncommon.

The *Pneumococcus* is an organism of universal distribution, but pneumococcus conjunctivitis is very unevenly distributed. Infection with the pneumococcus was found thirty-four times, or in 37 per cent. of the cases of bacterial conjunctivitis observed in Cleveland. In New York 27 per cent. of the positive cases were of pneumococcus origin. In Toledo, Snyder found a similar infection in 28 per cent. of the cases which were associated with causal organisms. Similar findings have been reported from Chicago and from Omaha as well as from Marburg, Breslau and Rostock. In Freiburg the pneumococcus was not as often observed, there appearing about 5 per cent. of such cases among 622 positive cases. In Lausanne, Glasgow and Aberdeen there was but 4 to 5 per cent. of pneumococcus infection among those cases of bacteriologically positive conjunctivitis which were studied.

Streptococci were found ten times, or in about 11 per cent. of the positive cases of conjunctivitis studied in Cleveland. In one of these cases a streptococcus which was Gram-negative both in the original slide preparation and in culture, was associated with a severe conjunctivitis. In this case there was a free purulent discharge, marked chemosis and swelling of the lids.

The *Streptococcus mucosus* was observed in one case of severe conjunctivitis in which the conjunctiva was chemotic and the lids swollen. Based upon the appearance of the conjunctiva and of the lids a diagnosis of panophthalmitis was made in this case, without inquiry as to the bacterial findings, and the eye was enucleated. Because of a corneal scar the vision with this eye was poor, but it was the only eye the patient possessed, the other having been previously excised. No signs of panophthalmitis were apparent in the enucleated eye.

Two cases of infection of the conjunctiva with the *colon bacillus* were observed. One case was that of an infant 3 days old, in whom both eyes were affected, there being chemosis and mucopurulent discharge. The second case occurred in a patient 73 years old who had a cataract in each eye. The eyes of this patient were treated for more than a year before the bacteriologic findings warranted the performance of a cataract extraction.

The *Staphylococcus pyogenes albus* was found in one case, and this is the only case of the many in which white staphylococci were observed in which there seemed established a causal association with the conjunctivitis. The Meibomian glands of this patient were stuffed with secretion and there occurred occasional active foci of lid infection from which the white staphylococcus was recovered. Twice cultures of this organism were inoculated into the anterior chamber of rabbits, and each time a violent hypopyon iritis occurred and an associated muco-purulent conjunctivitis.

Influenza bacilli were found in two cases. The gonococcus was found twice in this series, once in an infant and once in an adult.

The value of making routine bacteriologic examinations from the secretion of inflamed conjunctiva can not be too often urged. There are few or no typical clinical pictures by means of which the etiologic diagnosis of conjunctivitis can be made, and there are few cases in which a knowledge of the bacteria associated with the condition does not to some degree influence the treatment and management of the case. If one intends making such a study of his cases of conjunctivitis, he should first familiarize himself with the bacteria which inhabit the normal conjunctival sac. Ignorance of the fact that the normally found xerosis bacilli resemble somewhat the true Klebs-Loeffler diphtheria bacilli is responsible for an occasional startling diagnosis.

In many cases the study of a slide preparation made from the conjunctival secretion is sufficient, but in other cases cultures are necessary. Cultures would seem an advantage in every case, if the results are interpreted in the light of the findings from the original smear.

The technique employed in the study of the cases in this series consisted in the making of implantation slide preparations with a small swab which had been rubbed over the surface of the conjunctiva. The advantage of this method is that in cases with scanty secretion, more of the secretion will be obtained with the swab than with a loop.

The implantation of the secretion on the slide instead of smearing it about yields a preparation in which the cellular elements are nearly perfect, instead of being broken up. Toluidine blue solution was employed for staining, and the sharpness and definition of the picture obtainable with this stain are equalled by none of the more commonly employed stains.

[The conclusions of Metz are largely corroborated by the experience of the Editor while he was in charge of Ophthalmology in the Base Hospital at Camp Sherman last summer and autumn. There an epidemic of conjunctivitis—"pink eye"—broke out, that attacked 1500 soldiers of the draft. Of the hundreds of bacteriologic examinations made of the discharges from the conjunctival sac, not more than 5 per cent. showed the Koch-Weeks bacillus; on the other hand, the percentage of pneumococcus was large. This subject is now being written for publication by Major Kirshner.—ED.]

The Localization of Streptococci in the Eyes. A Study of Experimental Iridocyclitis in Rabbits. With the idea of tracing the changes in the power of an organism (streptococcus) which had already given rise to iridocyclitis in a patient, Irons, Brown and Nadler[1] instituted experiments on rabbits. These were made after varying periods of residence in the original host, of residence in animals tissues, and of growth on culture media. The accessibility of lesions of the eye to observation greatly facilitates studies of this sort. The exact time of the appearance of the lesions and their course can be more readily noted than when the lesions are in joints or other organs. Minor lesions which might escape notice, or disappear before the death of the animal when they involve joints or internal organs, are more easily detected in the eye.

The experiments of Forssner in which organisms after being grown in a special organ of the body, such as the kidney, acquired the power to localize and produce lesions with increasing frequency in that organ after intravenous injection, suggested the possibility of producing by successive transfers from eye to eye in rabbits a similar localization. The left eye of a patient suffering from a chronic dacryocystitis became acutely inflamed (iridocyclitis), April 11, coincidently with an acute exacerbation of the inflammation of the tear sac. It is obvious that the streptococcus from this patient did not acquire its quality of localization through actual previous residence in the tissues of his eye, and even if we admit the possible influence of residence in a contiguous organ (tear duct), this relation could hardly be held to explain the course of events in other cases in which ocular or other metastases originate from primary bacterial lesions in distant parts of the body.

Nevertheless, it seemed desirable to find whether an organism which had previously produced iridocyclitis in rabbits could regain this quality of localization by continued growth in the tissues of the eye. Hemolytic streptococci isolated from the tear sac April 28, produced typical iridocyclitis in three of four rabbits injected intravenously. Hemolytic streptococci isolated from the tear sac May 24 produced iridocyclitis in two of four rabbits injected. Cultures of hemolytic streptococci from the tear sac, taken on May 26, May 28, June 2, June 7, and June 16, failed to produce iridocyclitis in a total

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(1) Jour. Infect. Diseases, vol. 18, p. 315.

of twenty-two rabbits, injected with other organisms from broth culture inoculated directly from the patient, or in pure culture after isolation on blood agar. That the failure of later cultures to produce iritis was not fortuitous, but more probably due to some change in the invasive power of the organisms for ocular tissue seems evident from the fact that, whereas in the first two series, five of eight rabbits injected developed iridocyclitis, in the later five series of cultures twenty-two rabbits showed no such lesions. Furthermore, in the later experiments twenty-four other rabbits received the same streptococcus either in pure culture or with other organisms without the production of typical iridocyclitis, such as was observed in the first five rabbits.

The ability of the cultures to produce lesions of the eye was lost also in transfer from rabbit to rabbit, although iritis was produced in Rabbit 26 by intravenous injection of the hemolytic streptococcus from the eye of Rabbit 10. This loss of power to produce iritis in rabbits was not accompanied by any demonstrable decrease in virulence for rabbits. In cultures the quality of localization in the eye was lost after the third or fourth subculture, usually within a very few days after isolation. In the case of the first rabbits injected, however, cultures produced iritis seventeen days after isolation from the patient.

Attempts to obtain a return of invasive power for tissues of the eye in strains of streptococci which had lost it, by growing the organisms in the living eye, were unsuccessful in one series after passage through five animals, and in one series after passage through seven animals.

These experiments seem to indicate that the invasive power of an organism for a special tissue may change within a short period of time during residence in the original host, during animal passage, and in culture, without pronounced or constant changes in cultural characteristics, or in general virulence for animals.

[The Editor has many times pointed out the ineffectiveness of employing the rabbit's, the guinea-pig's, and similar lower-animal eyes for experiments of this kind. It is well known that the various animal tissues, including blood-, nerve- and lymph-supply, radically differ from their analogues in man. It is logical to assume, therefore, that pathologic processes and notably the reactions in infection, are measureably different in the two cases. This is a serious consideration, because the almost innumerable array of articles, reports on laboratory investigations, etc., whose conclusions are based on lower-animal experiments, make up a large percentage of the ophthalmic literature devoted to original research.

The Editor believes that all this mass of laboratory and allied effort has been made largely in vain. No definite conclusions worthy the name can be drawn from work of that sort. The time surely is coming when scientific men will insist upon having ophthalmic (and other) laboratory experiments made either on human individuals or, better still in the majority of instances, on the tissues and organs of the higher monkeys.—ED.]

DISEASES OF THE EYELIDS.

Ionization Treatment of Cancer of the Eyelids. Zinc ionization by the unipolar method is said by G. B. Massey[2] to be particularly well adapted to destroy small epitheliomas situated at the edge of the eyelids or on their external or internal surfaces because of the small current strength needed, making it possible to depend on the electrochemical union of the zinc ions with protoplasm as the destructive force alone, without the development of effective heat for this purpose. One or more very fine zinc needles are inserted in the middle of the growth, from which the zinc ions are radiated in all directions under the cataphoric action of the direct current, with a negative pad elsewhere on the body surface. By inserting the needles in the diseased tissue alone and observing the progress of the whitening effect, the ionization may be confined to the growth and its actual edges of normal tissue, thus conserving a maximum portion of the unaffected eyelid. The low voltage of the direct current is an important advantage in the delicacy of this application in this situation. Complete destruction

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(2) New York Med. Jour., April 21, 1917.

of the morbid tissue should be aimed at in one application of from fifteen to thirty minutes' duration, with a current proportioned to the size of the growth. Local anesthesia is usually sufficient.

With more extensive growths about the orbit, bipolar ionization is quicker and more effective; the positive zinc needles are inserted just beyond the edges of the growth and the negative in the center; the current may be increased to 500 or more milliamperes without having any material part traverse the eye structures, since the bulk flows between the two poles. With the larger currents great heat is evolved in the midst of the growth itself, usually a boiling or near boiling temperature, which materially assists in the quick destruction of the growth. General anesthesia may be necessary.

The needles are cut from one-sixty-fourth inch sheet zinc and attached to No. 34 cotton-covered copper wire, and after insertion are kept in place by adhesive plaster attached to the wire. The eyelid should be retracted by the finger or with a hard rubber retractor.

Massey gives the histories of twelve patients with operable growths of the lids, some small, some extensive, all of whom have remained free from disease for considerable periods. A summary account is also given of six inoperable cases, in none of which the disease was eradicated; three of these were inoperable sarcomas of the orbital cavity and three similar carcinomas, all were recurrent after enucleation of the eyeball or the exenteration of the orbit; in one of these cases death resulted; in the others merely palliation. He thinks better results might now be possible under more recent bipolar technique, provided, of course, that the disease has not passed beyond the orbital foramen.

Painless and Bloodless Removal of Chalazion Without Lid Clamp. While the application of the lid clamp, for the removal of chalazion, controls hemorrhage, it is quite painful even though the conjunctiva is quite well cocainized. As soon as the clamp is released, an annoying bleeding occurs and the curettage of the sac makes even the most stoic wince. It occurred to E. J. Bernstein(3) that it would be a gain if he could make use of the Freer method of anesthesia and blood control used in nasal surgery.

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(3) Jour. Amer. Med. Ass'n., Aug. 18, 1917.

A cotton-tipped probe is dipped into the stock solution of epinephrine, and a few flakes of pure cocaine picked up; this is rubbed into the conjunctiva over the mass and a short distance beyond. In two minutes, with the same probe and solution, the area is again rubbed. In another two minutes anesthesia and blanching is complete. After making the cut into the conjunctiva, the writer has made use of Meierhof's tympanum curette to remove the sac. This curette differs from the ordinary type in that its edges are serrated and thus thoroughly remove the whole sac with the least damage.

The Operation for Cicatricial Ectropium. Kuhnt[4] gives his experiences of 222 blepharoplasties performed by himself. First, he emphasizes two important general points. Blepharoplasty ought only to be attempted after not only the injury, cauterization, suppuration, are entirely healed, but also after the subsequent cicatricial process is completed and the infiltration of the surrounding and underlying tissues has subsided. In order to avoid any possibility of infection, there must not be any suppuration in the face, nose, accessory sinuses, or ear, nor on the head or neck.

In detaching the ectropic lid, the incision must not be made near the ciliary border, but as far as possible, at least from 5 to 6 mm., distant from it. If the whole horizontal extent of the lid is ectropic, Kuhnt incises at the lower margin of the eyebrow, and very carefully dissects the skin by flat cuts from the underlying scar to or near to the ciliary margin, so that if brought into normal position the lid is free from any traction. The scar must be excised as radically as possible, especially all tough strands radiating into the depth and vicinity. This can not be sufficiently done if the whole surface is a scar adherent to the bone. Here some horizontal and vertical deep incisions or excision of narrow stripes have proved to the writer very beneficial. Very important are also the applanation of the wound surface after excision of the scar and the smooth trimming of the

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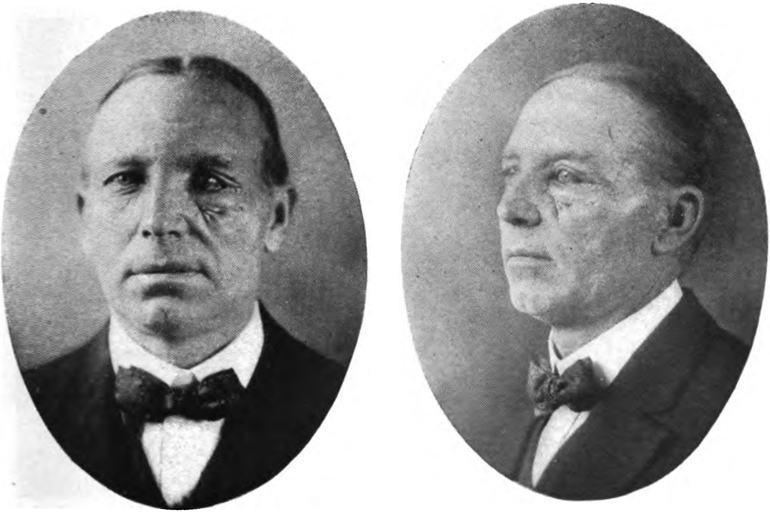
(4) Zeitschr. f. Augenhlk., vol. 34, p. 258.

PLATE II.



Showing result of pedicled flap operation.—F. Allport, page 50.

wound edges, which should be undermined for 0.5 cm., and finally the stopping of hemorrhage.

The third act of transplantation of pedunculated or non-pedunculated flaps and the advantages and disadvantages of either method is critically discussed in detail. For covering larger defects Kuhnt hesitates to use pedunculated flaps. He attributes the claimed homely thickening and puckering of pedunculated flaps to insufficient elimination of scar tissue and to inadequate fixation on the wound surface and its edges. This is avoided by fixating the flap on the surface by double armed catgut inserted in the surface of the wound and carried from the corresponding wound surface of the flap to the epidermis. The necessary equal spreading of the flap in its whole thickness is thus secured by these sutures in consequence of greater tension in the stroma in the depth and lesser on the surface. The shrinkage of the flap amounts to scarcely more than one-fifth of the circumference.

The non-pedunculated flap, taken from the upper arm or thigh, must be at least twice as large as the defect. The wound surface must be much larger than the later lid. This is attained by undermining the wound edges for 0.5 cm. and by inserting near the lid border double armed sutures from the mucous membrane to the epidermal side, 2 mm. distant, for formation of the upper lid, stretched toward the forehead, for the lower lid toward the cheek. The broad overlapping of the border of the flap by the well nourished surrounding skin serves as an ideal protective covering by living tissue against immigration of microörganisms. After a few days the superimposed edges of the flap and the surrounding skin retract and are in linear contact. Accumulation of wound secretion may be drained by one or two incisions about 1 cm. long in the lower portions of the flap.

The operator had the same good results with transplantation of one or two larger flaps as with smaller pieces according to the method of Thiersch. The latter is easier, while the larger flaps give a more uniform appearance. In both procedures a subcutaneous panniculus of fat develops, so that the skin becomes folded

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and can be lifted, and there is a certain degree of sensitiveness.

An Extensive Plastic Ectropion Operation with a Pedicled Flap. In line with the excellent results that are being accomplished in Europe at the present time with plastic surgery of the eye, F. Allport[5] presents the report of an extensive operation done for ectropion of the lower eyelid, wherein the procedure employed was an incision and the transplantation of a pedicled flap.

He employed the so-called Indian operation, namely, transplanting the flap from an adjacent part, and calls attention to a few points which he believes were conducive to the success of the operation.

The patient, G. J., a railway employee, was struck by a train. Among other injuries he had a depressed fracture of the left malar bone. When first seen, about three months after the accident, he had an adherent cicatrix over the fracture, and there was an extensive and complete ectropion of the entire lower eyelid of the same side, the lid being drawn down to the scar. He presented a most unsightly appearance.

In the operation that followed, the first incision was about one-fourth inch below the edge of the lower lid, and followed the palpebral curve in its entirety. The integument over the cicatrix was well loosened and undermined in all directions by both sharp and blunt dissection. At the temporal end of the incision a large pedicled flap was cut in an upward and backward direction in the skin of the temple. The incision of the flap was such that, when it was transplanted below the eye, the lines of the flap and the lower skin incision corresponded. In the fashioning of this flap one will obtain a more satisfactory result and less tension on the sutures if the adjacent skin is extensively undermined, insuring a greater mobility. At this particular point, too, where the operation is so close upon the bony structure, the pedicled flap would doubtless survive where other forms of skin graft would be failures.

The sutures employed in the operation were interrupted, or single silk sutures, placed closely together,

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(5) Ophth. Record, November, 1917.

and the point of the operation most gratifying was the perfect approximation of the lower lid to the globe (Plate II).

Not much shrinkage follows this operation.

After the suturing was completed the underlying tissues were freed of all serum by rolling over the lines of suture a bit of rolled gauze. By firm "rolling" a considerable amount of serum is expressed, which otherwise would be an excellent culture medium, or cause suture tension by swelling.

A New Operation for Ptosis. Few ptosis operations, however successful they may be reckoned surgically, quite realize an artist's ideal from the esthetic point of view. Nearly all procedures which attack the levator do so from the skin side, which mode of approach must make for esthetic loss, owing to derangement of so many important structures—skin, areolar tissue, orbicularis, orbital fascia and the extensive strands from the levator. E. E. Maddox[6] contrasts this with the simplicity of approach from behind as practiced by Bowman: After double eversion of the eyelid, division of the conjunctiva along the upper margin of the tarsus brings the tendon in view and this can then be shortened without interfering at all with the natural beauty of the front of the eyelid. Bowman's operation was dropped because too difficult and because the excision of a large piece of the tendon left the door open for possible disaster if the suture should cut out and allow the lid to drop worse than ever.

Bowman excised the posterior or upper edge of the palpebral cartilage with about half of an inch of the levator inserted into it. Maddox's operation also approaches the tendon from behind but omits excision of the tendon and there is therefore no risk of cutting out

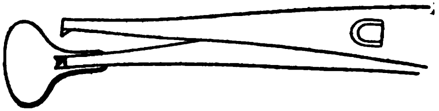

Fig. 2. Conjunctival forceps, showing addition of metal plate.

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[6] Brit. Jour. Ophth., vol. I, p. 358; abstract in Amer. Jour. Ophth., January, 1918.

of sutures nor are the structures connected with the anterior face of the tendon interfered with.

The operation is described as follows: The only special instrument required is a fine mouse-toothed conjunctival forceps to the tip of one leg of which has been soldered an oval strip of metal transversely. Adrenalized cocaine affords ample anesthesia. After effecting the first ordinary eversion the second eversion is made by grasping the extreme apex of the tarsus with the lid evertor, so that the metal plate shall lie against the tarsus, which is then everted the second time, and maintained in position by the weight of the instrument as it lies on the brow. The whole field of operation thus lies fully exposed. The conjunctiva is now divided along the upper margin of the tarsus. This is most easily done by transfixion with a narrow Graefe knife, after which a pair of scissors reflects the conjunctiva from the tendon so as to leave it fully bared. Its fibers are then seared, with an electrocautery, in longitudinal furrows from the tarsus to as high up as the case requires.

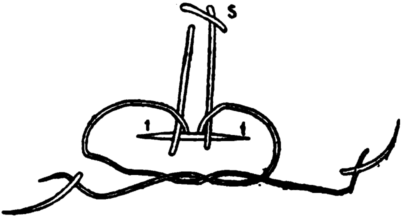

Fig. 3. Central suture before being tied. S, double turn in tendon; t, t, cut edge of tarsus.

A central bundle of tendon fibers is grasped with forceps and transfixed by a ring of thread and two similar sutures are placed on either side of the first. Next the apex of the tarsus is to be snipped off with scissors (though for a small effect this can be dispensed with), and the two needles of the central suture, either with or without an intermediate dip into the tendon, are passed solidly through the tarsus side by side, not too near its cut edge, from the conjunctival surface to the deep surface, and the needles brought out between the parallel threads, so that the knot, when the suture is tied, shall be sunk behind the upper edge of the tarsus without touching the cornea. Before tying, however, the two lateral sutures are passed through similarly, and then all are knotted. Two or three fine sutures to replace the conjunctiva complete the operation. The sutures are left undisturbed for two or three weeks and then easily withdrawn, but with as little stretching of the tendon as possible. The full effect of the operation is sometimes not obtained for three or four months. The final result is generally very pleasing.

No purely posterior operation is, of course, available in the congenital absence of a levator; but in acquired ptosis it always does some good, since even if the levator be completely paralyzed, the mere elasticity of the tissues working against the orbicularis counts for something. A posterior operation can, if necessary, be supplemented by an anterior one, such as Pagenstecher's sutures, to bring the frontalis into play as well.

DISEASES OF THE CONJUNCTIVA.

Parinaud's Conjunctivitis. Patient, a woman aged 28; right eye affected. The duration in this case was about three months, without suppuration of the glands and without any permanent injury to the eye. H. V. Dutrow[7] states that it is a mistake to use in this disease highly irritant agents such as copper sulphate, silver nitrate, etc., and especially the radical surgical treatment so often employed in the treatment of trachoma. The disease is practically self-limited and the best results will be obtained, he asserts, by the use of general cleansing, non-irritating collyria.

Primary Syphilis of the Palpebral Conjunctiva. A casual examination of the literature convinced Edward E. Maxey[8] that chancre of the conjunctiva was by no means a common condition.

According to Ginzburg, the first reported case of primary lid chancre was reported by Ricord in 1850. Many cases have been reported since then. Those giving any

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(7) Ophth. Record, April, 1917.
(8) Amer. Jour. Ophth., January, 1918.

extensive compilation vary greatly in their estimates of the number of cases reported.

In 1904 Terrien made the statement that there were at that time scarcely more than twenty cases of conjunctival chancre known. Ginzburg, in 1910, was able to find in the Russian literature alone about 210 cases of primary lid chancre and twenty-seven cases (twenty-eight including case reported by him at that time) of primary syphilis of the conjunctiva. In 1915 Finlay, in the literature at his disposal, was able to find about 100 cases of palpebral syphilis, and from different writers the total summing up of cases, he said, seemed to be near 500. Wolfrum and Stimmel, in 1910, reported two cases of primary syphilitic affection of the conjunctiva and make the claim that their cases make a total of seventy-one cases of conjunctival chancre reported.

Spratt, in 1913, reported a most interesting and rare case of lues of the bulbar conjunctiva. In his review of the literature he was able to find only twenty-one cases of lues primarily affecting the bulbar conjunctiva, his own case making twenty-two. Of these only three were located at the limbus. The writer has been able to add fourteen additional cases of bulbar chancre to those cited by Spratt.

Quoting from Rouvillois, Spratt says the relative frequency in which the structures of the eye may be primarily involved are: (1) the lid margin, (2) skin of lid, (3) palpebral conjunctiva, (4) cul-de-sac, (5) bulbar conjunctiva (scleral portion, inner angle and caruncle), (6) limbus and cornea. If we keep in mind the fact that from 6 to 7 per cent. (Spratt) to 9 or 10 per cent. (Fournier, cited by Spratt) of all primary lesions are extragenital, and, further, that in frequency of attack the eye ranks after the lip and finger (Alter) (1), or after the lip, breast, mouth, finger, hands and tonsils (Muncheimer, cited by Alter), with chancre of the cul-de-sac or fornix ranking fourth in frequency of the eye chancres, we may arrive at a fairly accurate idea of the relative infrequency of primary lues of the fornix.

In the literature for the past seventeen years Maxey has been able to find only three cases of chancre of the inferior fornix (Mathewson), Wolfrum and Stimmel, and Suda, and three of the superior fornix (Fischer-Galati), Ormond and Pannunzio reported. There may be others among those classified as "indefinite," where the title is obscure or the article not available for review, but probably not many are improperly classified.

Maxey's patient, a dentist, aged 23, unmarried, consulted him Oct. 3, 1916, with, as he explained, "a badly infected eye," and the following history was elicited: On September 5 he gave the anesthetic for a doctor associate who was doing a tonsillectomy on a young woman of easy virtue, several times assisting in swabbing out the throat and mouth. Maxey's patient has an indistinct recollection of rubbing his eye at the completion of operation, but he does not remember that the patient coughed into his face, but this might have happened.

On or about September 25 he noticed an itching sensation in right eye and the following morning there was a slight redness of conjunctiva which continued for five or six days without other noticeable symptoms. Then was noticed a slight mucopurulent discharge, sufficient to make it an appreciable effort to open the eye of mornings. About this time he also noticed a slight soreness and foreign-body sensation in the eye, and from day to day the redness increased, the conjunctiva became edematous, the lower lid more and more swollen, and finally the pre-auricular and submaxillary glands began to enlarge and became tender.

The treatment had been frequent irrigations with boric-acid solution, cold compresses, and one application of nitrate of silver solution, strength not known, immediately neutralized with salt solution.

The patient's personal and family history were negative. On his first visit the lower lid was greatly swollen and indurated, the palpebral and bulbar conjunctiva deeply congested and chemotic, fully half the cornea being covered by the overhanging edematous conjunctiva. The upper lid was moderately swollen but not indurated, the cornea was clear and unaffected, and the media, iris and fundus were unchanged. The right pre-auricular gland was as large as a small hen-egg, and the submaxillary and subauricular glands were almost as large, and all were tender on palpation.

On everting the lower lid there was seen a shallow ulcer, 4 by 8 mm. in area, at juncture of middle and external thirds of deepest portion of inferior fornix, limited entirely, however, to the palpebral conjunctiva. The ulcer was covered with a dark grayish membrane. There was a limited amount of photophobia and lachyrmation, a slight mucopurulent discharge, and pressure elicited a moderate degree of soreness in the indurated lower lid, but there was little or no pain in the lid or indurated glands if undisturbed. The temperature and pulse were normal. Smears from surface of ulcer and neighboring conjunctiva showed no pathologic organisms, but the spirochetes were not specifically searched for at this time.

The above history as to probable method of infection was not obtained until after the patient had been under observation in hospital for about a week, during which time the ulcer was thoroughly cauterized, but there had been no response to treatment during this time, and it was not until this time that the writer began strongly to suspect a chancre. Scrapings from the ulcer area were again examined, this time particularly for spirochetes, but the laboratory report was again negative, and October 12 Wassermann was also negative. On October 19 a second Wassermann was reported "doubtful," but the third Wassermann, made November 2, was three plus positive, and on this date also the secondary symptoms began to appear on the skin and in the throat, with loosening of hair of scalp and eyebrows.

All doubt as to diagnosis was now cleared up and on the following day salvarsan was administered intravenously, followed by mercurial rubs and other antiluetic treatment. Within forty-eight hours after administration of salvarsan the conjunctiva began to clear up, the induration of lower lid and glands gradually receded, and the secondary symptoms soon disappeared entirely. After three weeks of specific treatment the patient passed from observation. The eye at this time was not entirely normal, there being still a slight amount of induration in lower lid at site of healed chancre, some hyperemia of conjunctiva, and the glands, though very markedly reduced, were still palpable.

The fact that the specific organism of syphilis was not demonstrated in the palpebral lesion is probably due to the previous cauterization or, possibly, to faulty technique. A thorough search was made for other possible points of invasion, but the genitalia and all other parts of the body, except the eye, were entirely free of suspicion. This, with the specific character of the eye lesion, the adenopathy, the characteristic throat and skin lesions, the falling hair, and the final three plus positive Wassermann, make the diagnosis, in Maxey's opinion, unquestionable.

An Aborted Case of Adult Gonorrheal Ophthalmia. The case, as reported by Lieut. W. D. Stevenson,[9] was seen and treated in the service of Major Casey Wood, Department of the Eye, Section of Surgery of the Head, Base Hospital, Camp Sherman, Ohio.

H. B., private, aged 21, was admitted to the hospital on October 23 for treatment of catarrhal jaundice. He was also suffering from gonorrheal urethritis of two weeks standing.

Oct. 28, 1917, the patient complained of intense burning of both eyes and lids. The ward surgeon, Lieutenant C. G. Glass, was called, and on examination found a well-marked conjunctival congestion. Realizing that the trouble was probably due to a gonococcus infection, he promptly made a smear from the secretion and sent it to the hospital laboratory, where the chief of that service, Captain Proescher, and the members of his staff, readily discovered the bacillus of Neisser. The ophthalmic department was notified at once.

The lid skin of both eyes was found to be slightly discolored and swollen; the palpebral conjunctiva was somewhat congested and there was moderate congestion of the ocular conjunctiva. A slight watery discharge, with a little mucus, was present. Both eyes felt distinctly uncomfortable.

At 8 p. m. the patient's palpebral conjunctivae were painted with a 10 per cent. solution of silver nitrate. The eyes was then flushed with normal saline solution.

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(9) Ophth. Record, December, 1917.

During the night of October 28 and the day following cold compresses were applied to the closed eyelids for alternate fifteen minutes. Then the intervals were increased to three hours, with half-hour applications. During the night of October 29 and the whole of October 30 cold applications were made every six hours. On the first of November all medication was discontinued, the man being practically well. On November 2 the patient was discharged from the ophthalmic service, vision being 20/20 in each eye, and has so continued.

In addition to the almost constant application of cold moisture during the first twenty-four hours, 25 per cent. argyrol solution was dropped into the eyes every six hours. Irrigations were not used at any time. The lashes were cut short and sterile vaseline smeared into their stumps to prevent agglutination of the lids from the moderate mucoid discharge.

The chief feature of this case is the confirmation of Credé's contention that nitrate of silver is a specific for the gonococcus infection, if it be used before twenty-four hours have elapsed and before the organisms invade the deep structures. It also demonstrates the efficiency of a well-organized hospital staff, whereby the character of an infection is promptly recognized and treated by proper means. The case did not exhibit the usual bulbar and marked lid chemosis, nor purulent discharge, for the simple reason that it was recognized early and steps were taken to neutralize the poison. It may be objected that 10 per cent. was an unnecessarily strong solution of silver nitrate to employ, that 5 or even 2 per cent. would have been enough, but in the presence of such a virulent agent as the gonococcus, it is, perhaps, well to give the patient the benefit of the doubt.

Remarks Concerning Vernal Conjunctivitis. In the *Ophthalmic Record* October, 1903, F. Allport[1] reported a case of vernal conjunctivitis treated principally by the *x*-rays. So far as he knew this was the first reported case of vernal conjunctivitis in which an absolute cure of the disease was achieved. Many methods of mitigat-

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(1) Ophth. Record, August, 1917.

ing the suffering in such cases have been proposed. Remedies consisting principally of lotions, ointments, ice-packs and especially removal to cold climates as soon as warm weather begins, relieve but do not cure the disease. They merely ameliorate the suffering.

The case reported in 1903 was that of a young woman who was treated by the writer all one summer without result. He amputated the growths, curetted and cauterized their bases and did many other things recommended by various ophthalmologists, but early the next spring she presented herself at his office even worse than before. He had seen many warts of the skin effectually and permanently removed by the *x*-ray, and this fact led him to try the *x*-ray treatment upon this patient. On the advice of Dr. W. A. Pusey, he excised the growths and curetted them. The patient was then subjected to many thorough *x*-ray exposures. After she had had a few treatments her suffering rapidly lessened, the lids improved in appearance and she became absolutely cured, with a healthy conjunctival lining of all her lids. Allport has seen this patient many times since and her disease has never recurred.

This treatment has been tried in fifteen cases in his practice from that time to this. The patients have all been cured; that is, all who have carried the treatment through to the end.

W. A. Pusey has treated most of the cases. He is now using radium in one case and feels that it is quite as effective as the *x*-ray and much more convenient to use. He thinks it is also safer. The cure is generally assisted by the occasional use of tooth-brush brossage. The lids are rubbed with either boric acid powder or a 1-1000 bichloride solution, preferably the former. Allport also gives his patients a mild lotion to be used with the eye-cup, and they spray the closed lids with cold water and sometimes use ice packs in the first stages of the treatment. These patients are, however, under treatment only a short time before they begin to be comfortable and do not need the ice cold applications. Such patients are thus treated through the hot weeks of the summer without inconvenience to them.

Trachoma in the United States. According to J. McMullen[2] we are beginning to realize that our own country harbors this infection to an alarming extent and there is plenty of evidence that this disease is on the increase. A routine examination of the Indian reservations by the Public Health Service showed that many of them were heavily infected and the disease has also been found in various sections of the country. Trachoma is found extensively in the Appalachian Mountains, with the heaviest infection where the states of Kentucky, Virginia, West Virginia and Tennessee are adjacent.

A survey made by the Service in twenty-three counties in eastern Kentucky showed that 1,280 out of a total of 18,000 people examined were suffering from trachoma —that is, about 7 per cent. of the total number examined had trachoma. Of the number examined in this survey, 16,696 were school children.

Frequency of Occlusion of the Inner End of the Canaliculus in Old Trachoma. Like everyone who practices ophthalmology for some years, Harold Gifford[3] occasionally sees a case in which the canaliculus is obstructed at its inner end; but it is only within the last few years that he came to realize that in cases of long-standing trachoma, with much atrophy of the conjunctiva, this condition is so common as to constitute one of the regular features in the disease. Moreover, the condition is one which has much more than a scientific interest, since aside from the lachrymation which it generally produces, such a canaliculus is frequently a small pus-pocket and plays an important rôle in the production of the recurrent keratitis with which such patients are afflicted. Recently he has been testing the patency of the inner end of the canaliculus in all old trachoma cases, and has found, out of fifteen cases, only one in which at least one of the canaliculi was not occluded. Generally all four are found to be in this condition; with from one to four of the lot dilated and containing pus. Occasionally a canaliculus is occluded at both ends, with a dilated pus-holding portion between them. In such cases the tear-point may look normal and

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(2) Jour. Ophth., Otol. and Otolaryngol., February, 1917.
(3) Ophth. Record, September, 1917.

pressure on the canaliculus expresses no pus from the point, but if a dilator be passed a short way into the canaliculus and withdrawn pus will be seen to follow it.

This condition is subject to two kinds of misinterpretation. Judging from his own experience in the past, it is most commonly simply overlooked. The patients come with so much else wrong with the lids and cornea that the lachrymation is looked on as the result of the irritable cornea; or if the tear sac is pressed upon to see whether it contains pus, nothing comes from the tear points unless the pressure happens to be applied to one or more of the canaliculi as well as to the tear sac. On the other hand, if the canaliculi happen to be pressed upon and pus comes from the puncta it is supposed that the pus comes from the tear sac. For instance, he was recently misled in this way even after having become fully aware of the frequency of this condition. An old Bohemian with extreme atrophy of the conjunctiva had such a dilatation of the lower canaliculi that pressure over the tear sac region expelled so much yellow pus that the diagnosis of double dacryocystitis was made without hesitation, but on a more careful examination of the case it was found that no one of the canaliculi connected with the tear sac.

The writer has seen several cases of this sort in which the trachoma had entirely run its course and in which the recurrent corneal ulceration which was destroying the patient's sight was relieved by the proper treatment of the canaliculi.

In all the cases of this sort the suppuration has ceased when the canaliculi have been slit up and kept open, so as to unite the upper and lower ones; and a zinc collyrium used, together with any other treatment which the trachoma or suppuration of the Meibomian glands (which such cases almost always present) may require. In the only case of the sort in which Gifford was obliged to express a cataract he closed the cavities by destroying the lining of the dilated canaliculi with trichloracetic acid. In all of these cases in which he opened the tear sac, the duct has been found patent. Although it is not difficult to make a fresh opening from the canaliculi into the sac, he found it difficult to maintain such an opening. As soon as one stops passing the probe, the opening closes in a few days; and the impression is left that there is no great disadvantage in allowing the connection with the sac to remain closed. Such patients have had so much destruction of the tarsal glands that they are ordinarily but little troubled by excessive lachrymation.

The frequency of the combination of old trachoma and internal canaliculus-occlusion is probably another bit of evidence, if one were needed, of the extension of trachoma beyond the confines of the conjunctival sac; although it is possible that some of the effect on the closing of the canaliculi is due to the contraction of the tissues at the inner angle.

One may, then, conclude that in old trachoma with much atrophy occlusion of the inner ends of the canaliculi is so frequent as to be almost constant. It should be searched for systematically as a source of recurrent keratitis or of possible infection, in cases in which a cataract expression is to be performed.

Incision and Crushing Operation for Advanced Cases of Trachoma, in Which the Operation of Combined Excision of Conjunctiva and Tarsus Cartilage Is Refused. It has been the experience of D. W. and P. C. White[4] for many years to examine patients who presented advanced cases of trachoma of the eyelids with no apparent objective or subjective corneal symptoms. In a complete trachomatous examination many cases presented normal vision, and except by a retinoscopic test the cornea appeared like other corneae. In other cases deep, smooth opacities were found—with a resultant loss of vision. The patient in cases of this class would not undergo the proposed radical removal of the conjunctiva and tarsus, but desired a seemingly less severe surgical measure. In order to secure results and remove the pathologic tissue as nearly as possible the writers resorted to the method about to be described in eighty-six cases. This method has given more benefit than any other surgical measure, with the exception of the complete removal of the tarsus and conjunctiva. It is applicable to the palpebral cicatricial cases, where

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(4) Ophth. Record, May, 1917.

the deeper tissues are involved, and to the "beefsteak" cicatricial type, and to the smooth (chronic conjunctivitis) congested type of cases.

The Operation. An incision is made through the palpebral conjunctiva from the inner to the outer canthus of the eyelid, a few mm. from the margin (Plate IV, Fig. 2). The conjunctiva is dissected from the tarsus beneath from above downward to the edge of the cartilage (the edge), which is the beginning of the ocular conjunctiva. The dissection is carried out with a small flat scissors (Fig. 3). The next step is the incision of the tarsus from the inner to the outer canthus, using the same guide-line as in the incision of the palpebral conjunctiva. The tarsus is now dissected from the lower tissues beneath (Fig. 4) and a small scissors is introduced; one blade beneath the cartilage and one blade on top of the cartilage, and numerous vertical incisions are made in the cartilage (Fig. 5). A small roller forceps is used to crush the small vertical strips, by placing one roller above the cartilage and one beneath. The roller is beneath the palpebral conjunctiva (Plate V, Fig. 6); or the operator can crush the cicatricial conjunctiva as well as the incised cartilage by using the roller as in a common roller operation (Fig. 6A). The conjunctiva is sutured as in the removal of the tarsus and conjunctiva operation (Figs. 7 and 7a). The desired result is accomplished at one stroke, which may take Nature's pathologic measures years to accomplish—a disappearance of the cartilage (or fatty infiltration and atrophic degeneration), only a web-like net tissue remaining underneath the palpebral conjunctiva. This tissue will finally become a thin fascia-like tissue, which will act as a new modified cartilage for the lid. The weight and pathologic tissue (cartilage) is practically eliminated and the dense, now smooth, cicatricial palpebral conjunctiva does not bear down, or hug the cornea, thus bringing on the sequeles of trachoma.

The other procedure in this operation is not so popular with the authors as the above just cited. It consists in making vertical incisions from the fold of the everted eyelid to its margin and then supplanting this with roller forceps and crushing the incised conjunctiva and tarsal cartilage as in the common roller expression operation. After a number of years' investigation among the Indians of the United States it was found that a number of cases of entropion resulted from the contractions of the crushed conjunctiva and cartilage, and the final condition in many cases was less satisfactory than in the first plan described in this article.

This technique, though, is superior to any form of drug treatment or roller or expression operation.

Conjunctivokeratoplasty. W. Zentmayer[5] believes that this method of repair has not received the attention that the results attained by it deserve. He has found it of value in recent wounds of the cornea, in prolapse of the iris following perforating ulcers, in fistula of the cornea, and in recent staphyloma.

He exhibited a woman with a corneal fistula which had been repaired in this way. Nine months before, the eye had been injured by being scratched by a baby's finger-nail. She had been treated in another service and was first seen by Dr. Zentmayer two months before. Operation was at once advised, but was not consented to until six weeks later. The fistula was situated midway between the center and the lower border of the cornea in the vertical meridian. The eyeball was mushy and gave considerable annoyance. A keratome was introduced at the lower margin of the cornea, and before withdrawing it to do the iridectomy it was used as a support upon which to curette the fistulous tract and the surrounding margins. An iridectomy was then made. A conjunctival flap attached to both ends was then drawn up from below the cornea, so that the fistula was in its middle. It was pressed down into the hole, and two sutures were placed at the sclerocorneal margin above and below to hold the flap. The T. of the eye is now normal, the anterior chamber restored, and the eye quiet and painless. There was a cataract which could be removed later. The technique pursued is the same as that introduced by Kuhnt and recently described by Knapp, except for the use of the keratome for support in curetting the fistula and the taking of the flap from below rather than on the side of the

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(5) Ophth. Record, October, 1917.

PLATE III.

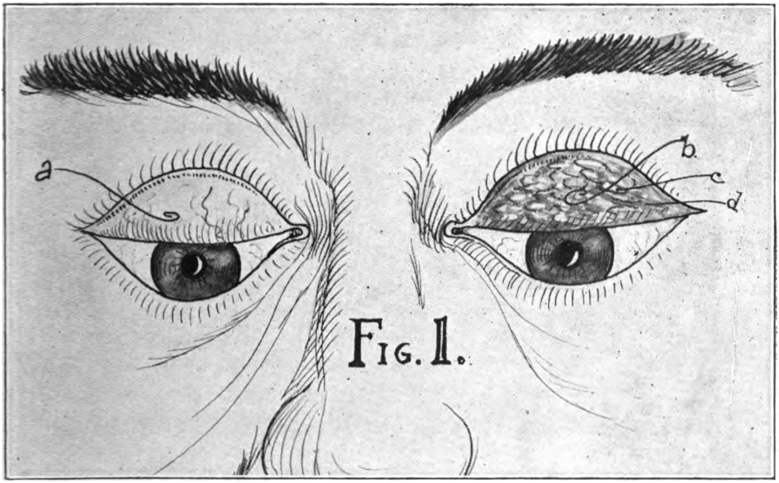

FIG. 1.

a, **normal eyelid;** ***b,*** **trachomatous eyelid of 15 years' duration;** ***c,*** **knobs of cicatricial tissue;** ***d,*** **red "islands" of reddish cicatricial tissue.—D. W. and P. C. White, page 62.**

PLATE IV.

Fig. 2.

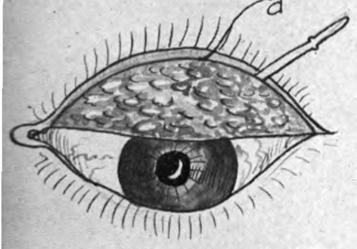

Fig. 3.

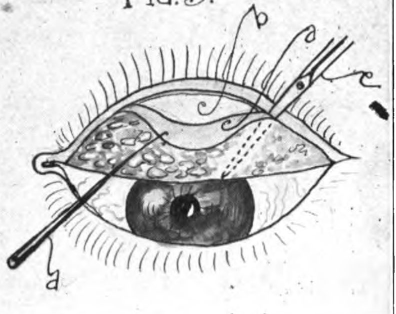

Fig. 2.
a, incision through trachomatous conjunctiva from the inner to the outer canthus.

Fig. 3.
a, trachomatous conjunctiva dissected and everted; *b*, pathologic cartilage; *c*, scissor dissection of palpebral conjunctiva to junction of palpebral and ocular conjunctiva.

Fig. 4.

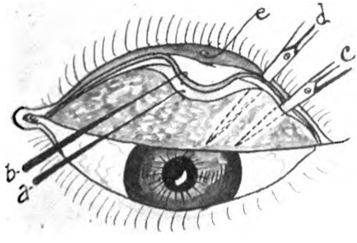

Fig. 5.

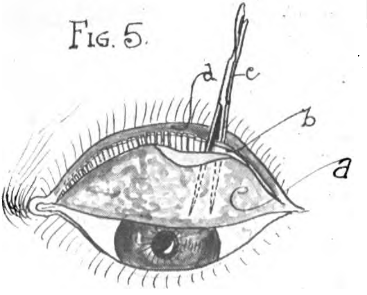

Fig. 4.
a, showing dissection of pathologic palpebral conjunctiva; *b*, showing dissection of pathologic tarsal cartilage; *c*, dissection scissors beneath the conjunctiva; *d*, scissors beneath the cartilage; *e*, tissue beneath cartilage.

Fig. 5.
a, pathologic conjunctiva; *b*, pathologic cartilage; *c*, showing pathologic cartilage being incised by small scissors. One blade of scissors is beneath cartilage and the other between cartilage and conjunctiva; *d*, tissue beneath cartilage.

D. W. and P. C. White, page 62.

PLATE V.

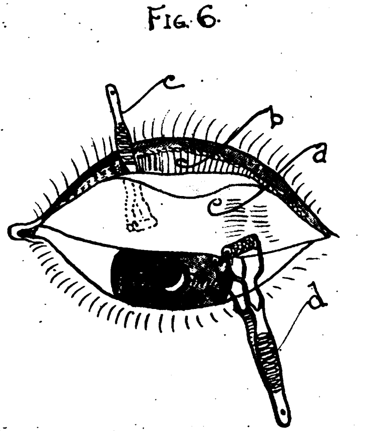

Fig. 6.
a, pathologic conjunctiva everted after dissection; *b,* cartilage incised into small thin strips; *c,* roller forceps crushing and milking the pathologic cartilage; *d,* showing roller method of crushing and milking cartilage and at same time, crushing the pathologic conjunctiva.

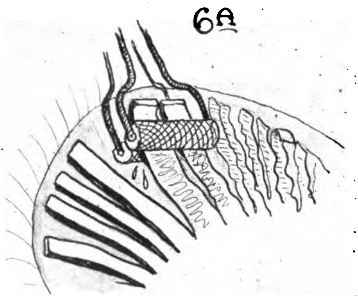

Fig. 6A.
Enlarged view of roller forceps and pathologic strips of cartilage.

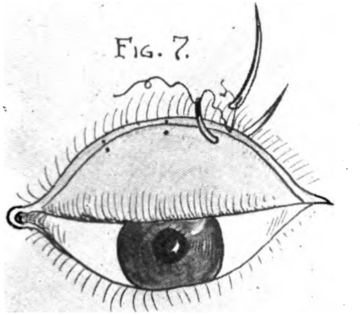

Fig. 7.
Conjunctival flaps replaced and sutures introduced through conjunctiva and emerging externally near eye lashes and tied. The pathologic cartilage has been milked and crushed.

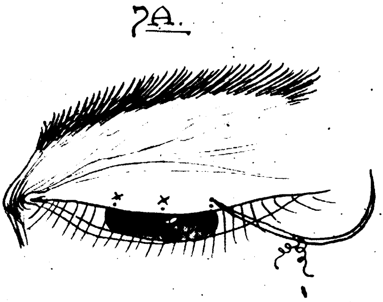

Fig. 7A.
Shows tied sutures on external skin of eye-lid near eye lashes.

P. W. and D. C. White, page 62.

PLATE VI.

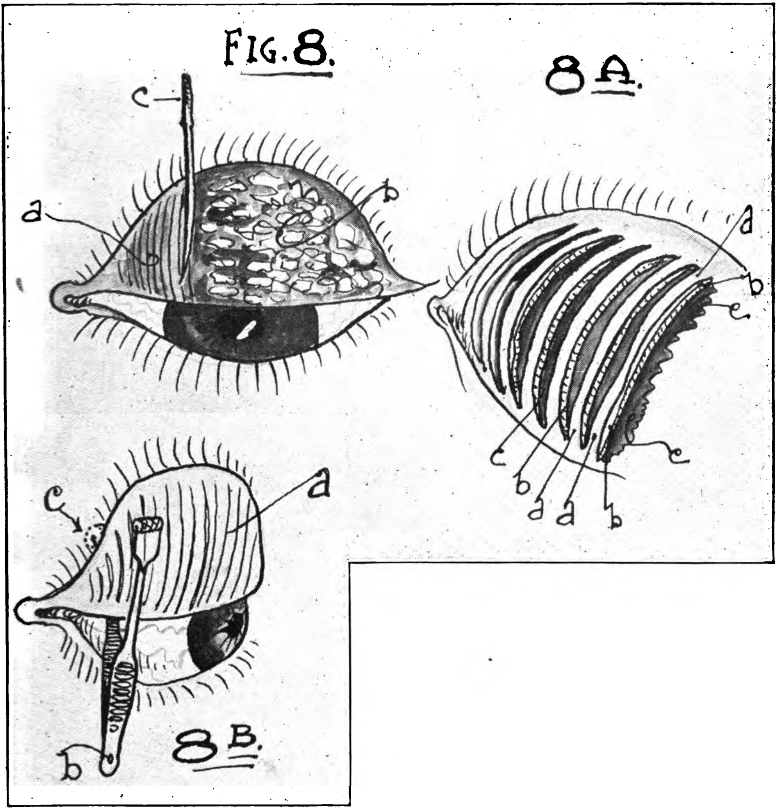

Fig. 8.
Showing method of incising palpebral conjunctiva and cartilage preparatory to rolling and squeezing with roller forceps. *a,* incised portion of conjunctiva and cartilage. (Note closeness of incisions and narrow strips as result.) ; *b,* trachomatous condition of upper eye lid.

Fig. 8A.
Enlarged view of conjunctiva and cartilage beneath after incisions have been made. *a,* conjunctiva strips ; *b,* cartilage strips ; *c,* tissue beneath.

Fig. 8B.
Roller forceps milking and crushing conjunctiva and cartilage after incisions have been made. *a,* conjunctiva ; *b,* roller forceps ; *c,* lower roller beneath lid and skin of face.

P. W. and P. C. White, page 62.

cornea. The latter method would seem, however, to be preferable.

A second case shown was one of prolapse of the iris following perforation of the cornea complicating purulent conjunctivitis. There was no longer any discharge, but the ulcer was still progressive. The prolapse was the size of a small white bean. The prolapsed iris was abscised and a conjunctival flap after the manner of the v. Lint cataract flap was made. It slowly slipped down and a small portion of the ulcer was exposed before healing had fully occurred. This has since closed and the anterior chamber has been reëstablished.

DISEASES OF THE LACHRYMAL APPARATUS.

Simple Intranasal Operation for Lachrymal Obstruction. A very simple operation is presented by H. L. Baum[6] in which a flap of muco-periosteum is raised over an area 1.5 x 1 cm. wide situated just anterior to the anterior attachment of the middle turbinated bone. This flap is excised. The writer has devised two curettes, right and left, whose bowl-like cutting surfaces are placed at an angle to the shaft. Just in front of the thin lachrymal bone to be curetted away is the hard ascending process of the superior maxillary. It is easy to feel one's way over this hard bone to the yielding, thin lachrymal bone and curette it away. If a lachrymal probe is previously passed through the canaliculus into the duct, it affords a landmark in the sac, as well as a background upon which to curette when removing the nasal wall of the lachrymal sac. By manipulating the end of the probe in the sac the edges of the mucous-membrane of the sac can be pushed into view in the nasal fossa and excised.

DISEASES OF THE CORNEA.

Letter Keratitis. The corneal disease designated *"Buchstaben keratitis"* is a rare affection. O. Haab[7] has discovered seven cases in the past eighteen years. For its observation a very intense lateral illumination

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(6) Ann. Ophth., January, 1917.
(7) Ophth. Record, March, 1917.

is necessary. One sees superficially small and larger zones composed of short, straight, sometimes crossing one another, raised, linear cloudings of the epithelium. In arrangement they resemble straight letters, such as "A," "W," "V" or "X." The larger lines may for a certain length be followed by a parallel double border. Scattered among them may be small round infiltrated zones, or a line may be interrupted by a group of these dots.

There is mild ciliary irritation. In from one to three weeks the process may terminate, but a marked characteristic of this keratitis is the tendency to relapse. Reduction of intra-ocular tension may complicate and finally permanent clouding of the stroma and corneal surface may destroy the usefulness of the eye.

Unusual Form of Superficial Corneal Opacity, Probably Atypical Epithelial Dystrophy. W. C. Posey[8] reports a case in which the opacity affected the upper and outer corneal quadrant and appeared in the eye of a healthy young married woman some time after what appeared to be an ordinary attack of acute conjunctivitis. At first consisting of but a faint stippling of the corneal epithelium, there developed later a dense glistening-white opacity in the affected area that was arch-like in form and superficially vascular. This haze traveled slowly across the cornea, the advance being made by the steady progression of the fine area of stippling just referred to. Posey explains the condition as being of corneal dystrophy, probably secondary to the conjunctivitis, the most marked changes residing in the epithelium, the dense white area representing the hyaline product of the changed epithelial and subepithelial elements. The patient had been irregular in attendance, and treatment had been applied very interruptedly, but massage with yellow oxide salves, and dionin, with applications of holocain and heat had gradually caused a subsidence in the progress of the opacity, the vessels gradually disappearing and the base of the mass growing more transparent. Posey referred to two similar cases seen by Bordley, in both of which there was a history of trauma through closed lids.

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(8) Ophth. Record, October, 1917.

Corneal Thermotherapy. Up to the present time, thirty-two cases of serpiginous ulcers of the cornea, hypopyon keratitis of pneumococcus origin, have been treated by W. E. Shahan[9] and the results have been so uniform and positive, that the method can be said to be very nearly specific. There was rapid cessation of clinical symptoms and steady replacement of destroyed tissues, and the visual acuity finally obtained in these cases ranged from perception of light where very nearly the whole of the corneal surface had been destroyed before the thermal treatment was used to full normal where the treatment was used before the onset of severe iritis.

The mode of application is as follows: After anesthesia and bleaching by means of several instillations of 5 per cent. cocaine in 1:2000 adrenalin, the applicator is placed upon the corneal ulcer and held there one minute. The extremity of the applicator should be of a size to cover the ulcer exactly; it is heated exactly to 158° F. by a special contrivance. There will be no pain during the application but there will be some for a few hours afterwards.

India Ink Infiltration; a Substitute for Corneal Tattooing. The method of tattooing corneal scars hitherto employed has consisted in making numerous needle pricks in the scar and then rubbing into them a paste of India ink. It is necessary to repeat this process many times with sufficiently long intervals to allow the inflammatory reactions to subside. This method has given such unsatisfactory results that corneal tattooing is now seldom attempted, either for cosmetic or for optical purposes. Moreover, it is open to the objection that it exposes the eye to serious danger of infection, and when the iris is caught in the scar, even to the danger of sympathetic uveitis.

It occurred to F. H. Verhoeff[1] that a simpler, safe and generally more satisfactory method of darkening corneal scars would be to inject the pigment or coloring matter into the tissue by means of a hypodermic syringe. He therefore tried this method, but instead

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(9) Amer. Jour. Ophth., November, 1917.
(1) Jour. Amer. Med. Ass'n., Oct. 27, 1917.

of making use of India ink, he employed a 20 per cent. solution of argyrol in the hope that permanent argyrosis would be produced. The result was most brilliant for about a week, at the end of which time the superficial layers of the scar were cast off, evidently because of necrosis from the toxic action of the argyrol. This made the scar thinner and much less noticeable, but of course was not the desired solution of the problem. It was noteworthy that the argyrol solution remained in the place it was injected and did not diffuse into the surrounding tissue to the slightest extent, thus proving that the penetrating power claimed for argyrol does not really exist.

Recently he has tried the method again in three cases, using India ink instead of argyrol, and the results have been entirely satisfactory. He made use of an ordinary small glass hypodermic syringe and a medium size needle (26 gauge). A very small needle might tend to become plugged by the ink particles. The India ink, in stick form, was rubbed up in a small amount of physiologic sodium chloride solution until a sufficiently black suspension was obtained. The fluid was then drawn up into the syringe through the needle, a piece of cork placed on the end of the needle, and the whole sterilized by boiling. The eye was then cocainized and held firmly by fixation forceps. After the syringe had been cooled and all air carefully forced out of it, the needle was introduced into the scar near the margin and the point pushed just beyond the center. The fluid was then slowly injected until only a narrow rim of the scar remained unblackened. In two of the cases it was necessary to insert the needle in two or three places to obtain this result, owing to the large sizes of the scars. The reason for not forcing the fluid quite to the margins of the scars was to avoid the possibility of its suddenly breaking its way into the normal corneal tissue. The uninjected margins of the scars, however, in none of the cases were sufficiently conspicuous to interfere with the cosmetic results. Great care was taken not to force the needle into the anterior chamber.

Following the operation, the eye in each case showed a slight reaction which subsided in about a week. In the course of a few weeks, the blackening became more uniform so that the ultimate results were superior to those immediately obtained. These results were far superior to those of any tattooing operations, and owing to the large amount of pigment injected and its depth in the tissues, there is every reason to believe that the improvement will be permanent.

DISEASES OF THE UVEAL TRACT.

Primary Progressive Atrophy of the Iris. Primary progressive atrophy of the iris with almost complete loss of all the iris stroma is a rare condition. Atrophy of a portion of the iris due to a specific, to a tuberculous lesion, to an injury or to increased intra-ocular tension is not uncommon. After careful search of the literature only twelve instances of the former appear to have been reported. Laura Lane[2] has recently added another to the list.

The patient has been under observation since October, 1915. She is a well-developed young woman of Bohemian descent, single, aged 20. Her parents are living and well. One brother and two sisters are living and well. A brother died of tuberculosis in infancy and two sisters have died of the same disease. Five other sisters died in infancy; the patient does not know the cause of death.

There is no other family history of importance. The patient's general health has been good. She has had a few of the minor diseases of childhood. Menstruation is regular. When she was 13 a facial acne vulgaris indurata developed. This has been of a very persistent type. She has had skilled treatment for this acne. She has never been entirely free from it, at times it improves; the face is deeply scarred, and numerous hard indurated masses are now present.

There is no history of injury. The patient is not of a nervous temperament. Two years ago she noticed the colored portion (iris) of the left eye had a small black hole in the margin of the pupil which extended down-

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(2) Ophth. Record, June, 1917.

ward into the colored part. Shortly afterward another hole appeared which extended toward the temporal side of the eye. At times the eye became inflamed. This would last for several weeks. There was little pain at this time, and never any secretion.

Gradually other portions of the iris began to retract and disappear, until the pupil had the appearance of a rectangle. The only iris left was four small bands. The eye became more painful and the vessels injected. About one year before consulting Dr. Lane the patient noticed the left eyeball was smaller than the right eye. Vision was poor, at times being worse than at other times.

During the past six months a film had gradually appeared on the cornea. The patient has been nauseated lately and during the past two weeks the pain interfered with sleep.

Status Praesens. "A distinct glaucomatous cloudiness of the cornea exists. The ball is considerably smaller than the other one. The ciliary vessels are deeply injected. Vision O. D. 6/30; O. S. fingers at six inches. Plus 2.00 cyl. ax. 90 gives 6/7 in O. D. Tension in O. D. is 22, in the O. S. 56. Blood-pressure 115. Slight red reflex is present but fundus cannot be made out. Good transillumination of each ball is present. The iris is almost completely absorbed. A small almost invisible band exists above and to the nasal side also, the iris tissue at the temporal and lower quadrants is only slightly more abundant. None of the bands of iris tissue join each other at any point.

"The right iris apparently normal. Physical examination: a tuberculin and a Wassermann test are each negative. The acne seems to be the only condition at all suggestive of a possible focus of infection.

"The patient was given prescriptions for dionin and physostigmine salicylate. Treatment was also instituted for the acne. In ten days the tension greatly improved, the cloudiness of the cornea was better and the vision better in each eye. O. D. being 6/20 and O. S. 1/60. There was no pain or nausea. Patient continued on this treatment except the dionin for some months.

"Late in January, 1916, the tension suddenly rose and the eye became painful. A trephining operation was done, a three-millimeter instrument being used. There was considerable difficulty in dissecting the flap and bleeding was troublesome. A clean disc was removed. The sclera was somewhat thicker than usual. No iris appeared in the trephine hole, nor was it possible to draw it up into the opening with forceps. A stab opening was made and the aqueous squirted about four inches above the patient's face so great was the intra-ocular pressure. The cornea at once became soft. An attempt was made to draw up the iris, but this was only partially successful as the iris was firmly adherent.

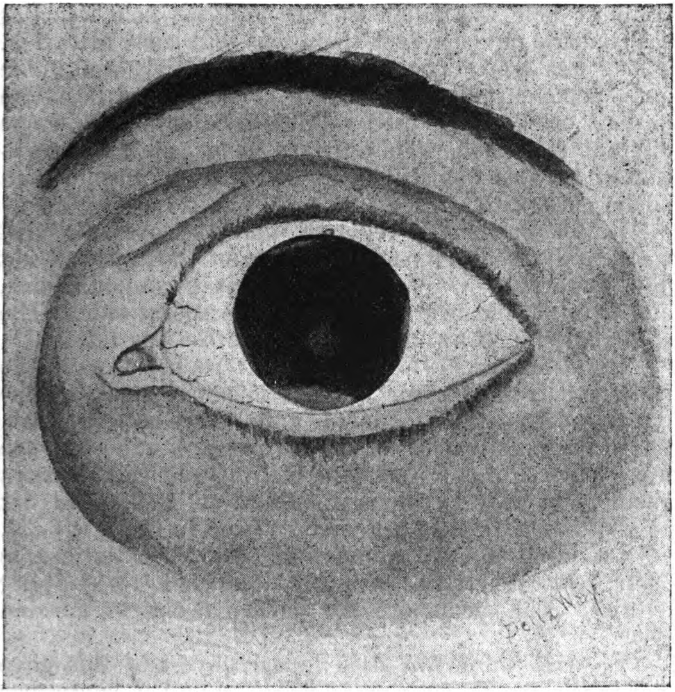

Fig. 4. Primary progressive atrophy of the iris.

"The eye healed rapidly, the cornea losing its haziness so the fundus could be indistinctly seen in a week following the operation. Vision at the end of the week, when the patient left the hospital, was 5/60. A large bleb remained over the trephine hole and the filtration was good. In a month it was noticed that the ball was larger, the cornea was practically clear and no injection of the vessels was present. Tension was 20.

"The patient was not seen again until November, 1916. The eye was clear, only a pin point haze over the center of the cornea remaining. The bleb over the trephine hole was much smaller and the hole was not easily made out, however there was still some filtration. Vision was 3/60. The fundus could be fairly well made out. Some cupping was present. The tension 28. The patient occasionally used eserine or dionin if the eye did not feel good. This always gave relief. Absorption of the iris was still going on; less was visible than on her last visit.

"In December she reported that the eye was still clear, and the difference in the size of the two was not now apparent. Only a trace of iris remained above, and a faint line below and to the temporal side. The accompanying drawing shows how little was left.

"In February, 1917, the patient reported with the right eye troubling for the previous two weeks. The pupil was partially dilated and somewhat sluggish. Slight conjunctival injection was present. The left eye was clear. Patient reports a bleb on the right cornea about four days previously. However, this could not be seen at the time of her visit. Vision in O. D. is 6/30, with correction 6/10 minus. O. S. 3/60. Patient is dizzy, nauseated, and has severe headache. No cupping of disc. The media are not perfectly clear. Tension is 30.

"Physostigmine was used in each eye and this gave relief quickly. Improvement in vision and in symptoms being rapid. The acne has not responded to treatment. Vaccines have been used. At times it is better. Various tests have not revealed anything to show the cause of the disappearance of the iris."

In the reports of de Schweinitz, Harms, Casey Wood, Zentmayer, and in this patient, increased tension has been found. No one yet has been able to show a definite primary cause for essential primary atrophy of the iris. Men and women are each subject to the condition. The period from twenty to forty has furnished most of the cases. Previous history of injury was found in at least four of the cases, but undoubtably could not be called a possible causal factor of great importance. Nervous tissue degeneration may play a factor, as in Dupuy-Dutemps reports of atrophy of the iris in tabes dorsalis.

Is the condition brought about by a sclerosis of the iris vessels? It seems quite probable, but is there not a primary cause for the sclerosis? Latent tuberculosis was undoubtedly present in several of the patients of those reporting atrophy of the iris, and must almost certainly exist in this patient from the family history.

Autotoxemia might be a factor. The acne which this patient has had for years is probably of this origin, as diet and eliminative treatment seem to produce a slight improvement.

It is hoped that someone may see this condition early when it is first beginning and make an exhaustive study. Many cases of partial atrophy of the iris or arrested condition of loss of iris tissue have been reported, but only a few go on to complete absorption of all the iris stroma and loss of vision. All the cases reported show more or less loss of vision. The question arises, will the other eye become involved in a similar process? As yet no report has shown this to have happened.

What was the meaning of the sudden rise of tension in the good eye without any distinct fundus findings of a glaucoma? Increased tension has been present in nearly all the patients reported. It appears that there may be some disturbance of the bodily metabolism which exerts marked action on the eye tissue, causing the increase of tension.

Heterochromia Iridis and Allied Conditions. As defined by E. C. Ellett,(3) heterochromia iridis is a condition in which the iris of one eye differs in color from that of the other. It is very rare, usually occurring in brunettes; and it is most often noticed first in early life or at birth. It may be either congenital or pathologic. Either no pigmentation is present in one eye, or it is present and is lost through some pathologic process. Heterochromic cyclitis results in cataract and glaucoma simplex. Under allied conditions are included cases that do not properly belong here, but are considered because there is a difficulty in the differential diagnosis. The most important of these allied conditions is glaucoma following uveitis. Some of the difficulties in diagnosis are illustrated by the histories of three cases of heterochromic cyclitis, two cases of heterochromic iritis with cataract, two of heterochromic iritis with glaucoma, and five of uveitis with glaucoma.

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(3) Ophth. Record, August, 1917.

Chorioidal Tuberculosis and Atrophy. E. Jackson[4] presented a patient, a young woman, who, until 19 years of age, had vision of 20/20 in the right eye, which suddenly diminished to 5/200. Ophthalmoscopic examination showed a central chorio-retinitis, with a large area of edema of the adjoining retina. The ophthalmologists, under whose care she then was, "were unable to determine any cause for the condition," although careful clinical examination of her general condition was made, which did not, however, include tuberculin tests. She was given pilocarpine sweats, mercurial inunctions, and Donovan's solution.

The patch in the macula went on to chorioidal atrophy with pigment deposit. She was first seen by Jackson eight months later. Vision in this eye was 4/45, with slight pallor of the outer quadrant of the optic disc, and chorioidal atrophy 2/3 of d. d. in the macula, with a small pigment patch at the fovea. The left eye was and has remained normal.

The condition continued practically unchanged for 16 months. Then vision grew worse. There was a noticeable extension of the scotoma, downward. Ten days later swelling and gray deposits to the nasal side of the old patch of chorioidal atrophy were seen. There was some pain and pericorneal hyperemia, with rise of tension to 4 on the Gradle instrument (presumed pres-

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(4) Ophth. Record, September, 1917.

sure 60 mm.). Shortly before this, swelling and soreness had developed in the metatarso-phalangeal joint of the great toe. Tuberculin injections gave both general and focal reactions. Under tuberculin treatment the process subsided, the additional patch of chorioid undergoing atrophy, the nasal larger portion of the lesion now seen in the macula. Vision in the right eye was reduced to 2/60 eccentric. There has been no evidence of fresh disease for more than four years. The patient was somewhat out of health when sent to Colorado, but has never given evidence of pulmonary tuberculosis.

The appearances presented supported the view of Stock and others that a large part of cases of chorioidal atrophy are due to tuberculosis.

THE CRYSTALLINE LENS.

Ring-Shaped Opacity in the Posterior Portion of the Lens. *The ring-shaped opacity as described by Vossius* is well known. T. B. Holloway[5] referred to an example of this type of opacity reported by Magruder, in whom there had been observed, after trauma, an opacity in the posterior portion of the lens. He then reported three cases, in none of which was there a history of trauma:

S. B., aged 22, first came to Dr. de Schweinitz's service at the University Hospital in May, 1906, with specific postneuritic atrophy. In October, 1915, he was referred from the hospital to the clinic for examination, at which time there was noted in the posterior portion of each lens a very delicate ring-shaped opacity made up of punctate dots, and which measured about 4 mm. in diameter. As a result of his pronounced atrophy the vision of the right eye was 2/150 and of the left 6/150. Chancre was admitted at the age of 18 years. In the past he had used alcohol to excess. There was a general adenopathy, moderate pyorrhea, soft systolic murmur, systolic blood-pressure 128, diastolic 80. Urine and serum Wassermann were negative.

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(5) Ophth. Record, October, 1917.

H. T., aged 60. First seen in Dr. Francis Sinkler's clinic at the Orthopedic Hospital and Infirmary for Nervous Diseases. There was a past history of partial hemiplegia. The existing symptoms warranted a diagnosis of cerebrospinal syphilis. The pupils were slightly irregular in contour, with distinct tendency to miosis, but there still remained the faintest light reflex with condensed light. The pupils became pin-point in accommodation and convergence. The discs were somewhat dirty in appearance, but with a suitable correction the vision was normal. In the posterior portion of each lens there was a very delicate ring-shaped opacity made up of pin-point dots, with a few scattered tiny opacities toward the periphery. A serum Wassermann was negative, but a spinal fluid Wassermann was positive.

Mrs. H. W., aged 41. First came to the University Hospital, owing to asthenopia, in October, 1915. The patient showed a moderate amount of anemia and had nephritis. Scattered through the anterior stromal layers could be noted some fine lens dust and a few dots, some of which, by oblique illumination, presented a delicate blue tint similar to the appearance seen in some cases of congenital punctate cataract. In the cortical layers, posterior to the nucleus, there was a vague circle of punctate dots 3 or 4 mm. in diameter, analogous in appearance to that seen following concussion of the globe. The right disc showed a suspicious pallor. In the left eye there were several small vague foci of retinochorioidal disturbance between the macula and disc. Unfortunately her medical data had been mislaid.

Holloway called attention to the fact that the lesions shown in these three non-traumatic cases could not be differentiated from the so-called Vossius ring-shaped opacity except from its location, which he believed to be in the lens between the nucleus and the capsule, but not capsular. He was not certain as to whether they were congenital or acquired, but from the fact that all of them had serious constitutional conditions, and two of them had delicate lens changes, he believed the evidence would point toward the latter.

CATARACT.

Bilateral Congenital Cataract. T. B. Holloway[6] exhibited a patient, female, aged 45 years, who had been referred to his service at the Polyclinic Hospital by Ealer. In each lens, situated in the posterior cortical layers, there was a triangular opacity with its base down, the width of the base being about 3 mm. as seen with a +7.00 lens. It was made up of innumerable closely packed dots, some discrete, others confluent. With oblique illumination the opacity could be seen to conform to the natural curvature of the posterior portion of the lens. About the lens in the anterior cortical layers could be observed a few scattered and discrete punctate opacities. The patient had had seven pregnancies, the last five resulting either in the early death of the infant or in miscarriage. A serum Wassermann test was negative. No known similar conditions were in the patient's immediate family.

Holloway referred briefly to some of the various types of congenital cataract, especially to the patient shown before this Section several years ago by Crampton. It was recalled that in that instance the triangular opacity was centrally located in a disc and that the apex was down.

The Indian Operation of Couching for Cataract. A paper based on statistics obtained from a study of 780 cases of couching which the author collected in India is given by R. H. Elliot.[7] In addition, he has obtained fifty-four globes on which the operation had been performed. He refers to this ancient operation as having been practiced by Celsus; with the advent of British surgery in India, couching attracted much notice, and the crude and filthy methods of the coucher excited horror among exponents of modern surgery.

There are two distinct operations performed—namely, the anterior, in which the lens is attacked through the cornea or limbus from in front, and the posterior, in which the incision is placed behind the ciliary body, well back in the sclera. The latter is by far the more

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(6) Ophth. Record, October, 1917.
(7) Brit. Med. Jour., March 10, 1917.

scientific procedure, two instruments being used, and a deliberate attempt being made to break down the suspensory ligament of the lens, before its dislocation is attempted. Owing to dirty methods and crude instruments, the results of couching are very bad, only 21 per cent. of the operations yielding vision of 0.1 or better, 60 per cent. of those lost being avoidable. The causes of failure are, in order of frequency, iridocyclitis, glaucoma and imperfect dislocation. The author found the cataractous lens dislocated forward four times in the fifty-four globes examined; dislocation backward was the rule, the lens lying either free in the vitreous, entangled in an exudate, or fixed to the back of the iris and ciliary body, or in front of the anterior hyaloid membrane.

Sometimes the coucher accidentally injures other structures such as the cornea, in which the writer observed opaque scars frequently. Scleral injuries are common as are also injuries to the iris. Wounds of the ciliary body are also frequent. The plastic type of uveal inflammation of varying severity, confined to the iris and ciliary body, was most ordinarily found.

A shallow anterior chamber was often observed, together with iris *bombé* in several cases. Abnormal contents consisted of pus, blood, a mixture of pus and blood, vitreous, lens matter and structureless albuminous exudate. In the great majority of the eyeballs the vitreous body was infiltrated with inflammatory material which tended to undergo organization and resulted in detachment. Detachment of the retina occurred in over 70 per cent. of the globes. A large number of the globes presented numerous dots on the retina, varying greatly in number, size and color (from white to gray or glistening) which were usually of long standing, thus indicating a degenerative process. The dots were caused by localized proliferations of cells along retinal vessels, by collections of mononuclear cells on the surface of the retina external to the limiting membrane and by small cysts developing in the walls of the retina as the result of the coalescence of edematous spaces therein formed.

Allowing for the fact that numerous globes had under-gone late changes calculated to hide evidence of previous glaucoma, nineteen out of the thirty left had suffered from high tension.

Suction Extraction of Cataract. Barraquer's[8] success in extracting cataract in the capsule by vacuum suction is followed by a historical review of cataract operations, with illustrations showing the David and Smith techniques and his own method. The latter does not require any pressure but merely draws the lens out in toto by vacuum suction through a shallow cup applied to the lens. He also gives illustrations of different apparatus for inducing the vacuum by electricity or a water-jet pump. The cataract extractor itself projects from a syringe-like instrument held in the hand like a pen, the thumb controling a valve that shuts off the suction at will. He dilates the pupil with cocaine and epinephrine an hour beforehand. This permits the use of eserine, and hernia of the iris is thus avoided.

RETINA AND OPTIC NERVE.

Sudden Obstruction to the Retinal Circulation in a Case of Cardiorenal Disease. A case is reported by Oram Ring[9] in a male patient, aged 57 years. The phenomenon, particularly the condition noted at the first visit with the cherry-red spot at the macula, pointed to what is commonly known as embolism of the central artery. A number of possibilities of explanation of this red spot have been made; little hemorrhages, retinochorioiditis, yellow pigment of the macula, but that most usually now considered is that it is caused by the red of the chorioid shining through the retina at the point where it is thin and the brilliancy is accentuated by a contrast of its surroundings, the cerebral layer of the retina in which the cloudiness is situated being absent at the macula.

The Influence of Vascular Disease in the Retina on the Prognosis as Regards Life. The most numerous cases of general medical interest seen by ophthalmic surgeons are those that have some form or other of dis-

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(8) Siglo Med., Oct. 13, 1917.
(9) Ophth. Record, February, 1917.

ease of the vascular system. With the idea of finding out what happens to these patients and when, P. H. Adams[1] undertook an inquiry and endeavored to trace the end of such cases. The types of retinal lesions selected were flame-shaped hemorrhages and signs of vascular disease in the retina, venous thrombosis and hemorrhagic retinitis, ''embolism'' of the central artery, retinitis curcinata; in fact all those conditions usually associated with arteriosclerosis. One hundred and fifty-nine cases were collected; 124 patients were traced; of the total number sixty-three were males, the remainder ninety-six females—fifty-eight were married and thirty-eight single.

After giving tabulated statistics of 156 of these cases and discussing the prognostic influence of these lesions, the writer concludes that retinal lesions are considerably more common in women than men, and that not altogether due to childbearing, as thirty-eight of the ninety-six women were, as far as he could discover, unmarried. The cases were most numerous between the ages of 60 and 70, and next between 50 and 60. The older the patient, the better the prognosis as regards life, irrespective of the presence of albumin in the urine to a large extent, while the younger the patient, the worse the prognosis, especially so if albumin is present in the urine.

Unusual Type of Familial Retinal Degeneration. At a meeting of the Section on Ophthalmology of the College of Physicians of Philadelphia, William Zentmayer[2] exhibited a boy, aged 9 years, whose sister, aged 10 years, had been exhibited at a previous meeting. Scattered throughout the retina, but especially grouped about the macula and along the course of the superior and inferior temporal arteries, were white or yellowish-white disciform lesions, mostly discrete but in places confluent, varying in size from twice to four times the diameter of the main trunk of the central artery of the retina. In the right eye the lesions in the foveal region were somewhat pigmented. The temporal halves of the nerves were atrophic. The child is healthy, well devel-

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(1) Brit. Jour. Ophth., March, 1917.
(2) Ophth. Record, October, 1917.

oped, and mentally sound. The Wassermann was negative, whereas in the sister there was a positive reaction. Otherwise the cases were entirely alike.

Hole at the Macula. Knapp in 1869 and Noyes in 1871 were the first to call attention to an anomaly of the fundus consisting of a circular punched-out hole in the macular region, but it was not until after the studies of Kuhnt and Haab in 1900 that case reports of this interesting condition became fairly numerous.

H. D. S., a negro, age 27 years, came into the service of Major Casey A. Wood at the Base Hospital, Camp Sherman, Ohio, complaining of poor vision in the right eye with a spot in the line of vision which had become quite troublesome. He admitted to Lieut. C. A. Burkholder,[3] in whose charge he was placed, that the sight in the affected eye had always been poor, but he could not remember just when it began to fail. When a young boy he received a violent blow on the right eye with a corn cob and for several days following was almost totally blind in the injured eye. The patient thought, however, that the vision had not been good for some time previous to the accident. He gave a history of the usual diseases of childhood, but was otherwise healthy with the exception of an attack of "scrofula" at 10 years of age. At 22 the patient was taken sick with what was diagnosed as syphilis. Although he denied a primary lesion, he gave a history of body rash, some sore throat with other symptoms which might be construed as secondary signs. The patient himself thinks that this attack was of a tuberculous nature, as he had a bad cough with profuse expectoration. He admits three attacks of gonorrhea. Although married four years he has no children. His wife has had two miscarriages and has been in poor health for the last two years. Both parents of the patient are living and have good eyesight.

Physical examination of the chest was negative.

Wassermann was negative.

Urine negative for albumin and sugar.

Blood examination showed 4,169,000 red and 8,600

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(3) Amer. Jour. Ophth., February, 1918.

white corpuscles. The differential count showed no variation from the normal.

Examination of the eyes showed:

Vision, O. D. 8-200
O. S. 20-15.

Refraction under a mydriatic gave 1 diopter of hypermetropia in each eye.

Right cornea negative.

Iris was not adherent to cornea or lens.

Vitreous was clear.

The lesion, as shown in the colored frontispiece, consists of a large circular excavation slightly larger than the disc, located in the macular region. The excavation is about 1 mm. deep with precipitous and sharply marked pigmented margins. The floor of the excavation is of a deep red mottled appearance, with a few grayish-white spots showing through. Surrounding the hole and closely approaching the edge are the grayish-white retinal margins which gradually extend into the normal retina. Numerous crystals of cholesterin are imbedded in the floor of the hole and the surrounding retina. No cholesterin crystals are discernible in the vitreous. The nerve head is apparently normal.

The visual fields show a slight contraction of form and colors with total loss of green vision. There is a large central scotoma corresponding to the lesion in the macular region. The left fundus is normal to all appearances. There are no cholestrin crystals in the left fundus or vitreous.

The pathology of macular hole as studied by Fuchs, Coats, v. Hippel, and others seems to point to a cystic degeneration in the retinal layers with subsequent rupture and formation of a hole.

Coats thinks that this degeneration is due to an edema of the retina at the posterior pole involving usually all of the layers of the retina, but may produce a retinal hole from edema of the inner layers only.

Fuchs points out that the pathology may be the same whether due to traumatic or inflammatory changes. There may be cystic formation followed by pressure atrophy or rupture and hole formation. He also con-

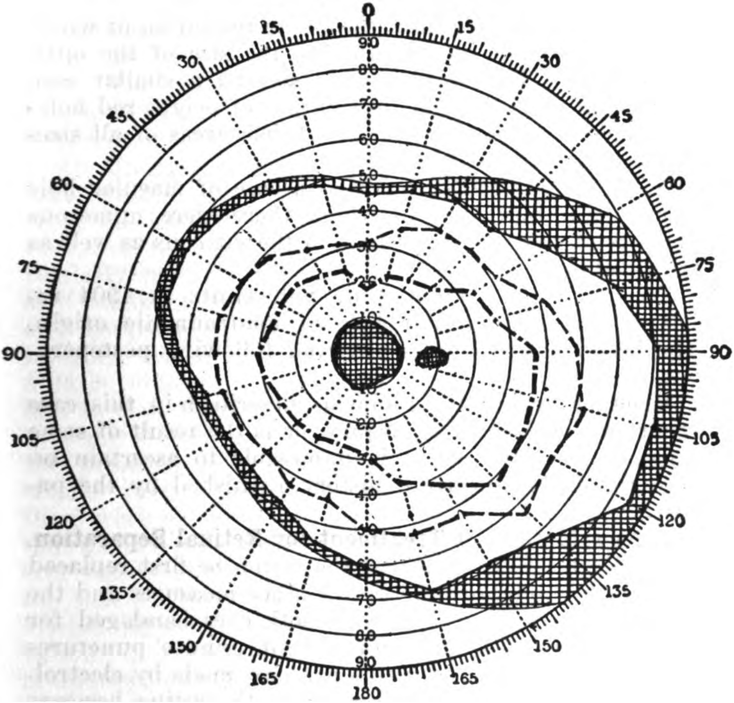

Fig. 5.—Field of vision, Burkholder's case of Hole at Macula. The outer broken line represents boundary of field for blue. Inner broken line field for red.

siders that a contusion might result in serious molecular changes and death of the cells with absorption without edema or cystic formation.

Twietmeyer reported two cases in 1909 which were caused by contusion of the eyeball. The injury was followed by a punched-out hole with a red base in the macular region.

One of his cases is of importance because the observer saw the patient immediately following the injury, at which time the macular region was opaque and the veins tortuous and full. In about three weeks this condition changed to a typical hole at the macula.

R. Foster Moore (1910) reported a case of concussion of the eyeball the ophthalmoscopic examination of which showed a hole in the macula 1⅓ the size of the optic nerve head. The opposite side showed a similar condition, but there was the appearance of bright red holes with shelving edges and many whitish areas of all sizes scattered about this region.

A. C. Clapp (1913) reported a case of macular hole following a contusion in which there were numerous deposits of cholesterin crystals in the vitreous as well as the fundus.

Zentmayer in 1909 and de Schweinitz in 1904 reported cases of macular hole of nontraumatic origin. The lesion has also been observed following postoperative iridocyclitis.

Whether or not the lesion as described in this case report was caused by an injury, or is the result of some inflammatory process, it is impossible to ascertain on account of the uncertain history furnished by the patient.

A New Method of Treatment for Retinal Separation. F. H. Verhoeff[4] advises that the retina be first replaced by means of scleral puncture or other measures and the patient then kept in bed with both eyes bandaged for about a week. A large number of minute punctures through the sclera and retina are now made by electrolysis. At the site of each puncture the retina becomes intimately fused with the chorioid and sclera as a result of the slight inflammatory reaction set up. The procedure may be carried out under cocaine anesthesia and is not actually painful, although very unpleasant to the patient. Verhoeff has employed a small steel half-curved eye needle, the current being obtained from a series of six dry batteries of 1½ volts each. The positive electrode in the form of a wet sponge is applied to the cheek. The conjunctiva is not dissected back, but the punctures are made directly through it. The slight conjunctival reaction resulting is of no importance. The needle point is pressed firmly against the globe until it penetrates the wall, when it is pulled back slightly so

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(4) Ophth. Record, January, 1917.

that the point protrudes only a millimeter or two into the vitreous, and then allowed to remain about five seconds. It requires about one-half minute for each puncture. The patient is afterwards kept in bed for about ten days to allow time for the retina to become firmly adherent.

An Unusual Form of Retinal Disease with Miliary Aneurysms. In a 16-year-old boy, who had suffered from this disease for three years, Komoto[5] saw in the retina of the right eye many small white masses particularly in the neighborhood of the macula, occasionally confluent, and over which the vessels passed without disturbance. In the center of the macula was an irregular white mass and on the nasal side of the disc a large crescentic area where the small white masses laid so close together that the picture resembled that of a retinitis circinatus. But the interesting feature was the presence of small aneurysms that lay along the smaller vessels like pearls. In one area above the disc these were multiple and combined with hemorrhages so that the two were difficult to differentiate. In the peripheral vessels, the aneurysms were relatively large but in the macula they appeared as small red points. The disease did not change during the three months of observation. This picture has been but seldom described and is unquestionably the first one seen in Japan.

Cyst of the Dural Sheath of the Optic Nerve. On May 25, 1914, L. B., a lad of 6 years, was brought to William C. Bane[6] with a history of having had frequent attacks of frontal headache during the previous six weeks.

Vision with the right eye was normal, media clear, fundus healthy. There was one diopter of hyperopia. Vision with the left eye was almost *nil*, the patient, at times, seemed to see movement of a hand 40 cm. from the face. Media clear. The optic disc decidedly atrophic and of pearl-white color. Hyperopia = 3D. Left eyeball unsteady in its movements. Correcting lenses were ordered and the high-frequency current used on the

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(5) Ophthalmology, April, 1917.
(6) Amer. Jour. Ophth., January, 1918.

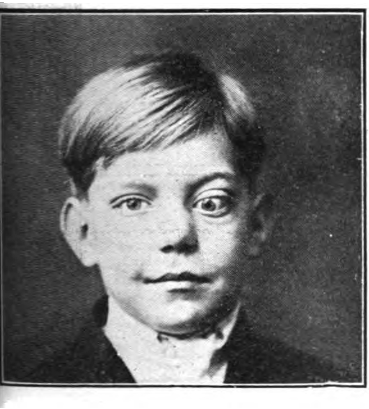
eye at intervals for about three weeks, when the treatment was discontinued.

Patient returned Nov. 18, 1916, when there was marked left exophthalmos. The eyeball protruded 5 mm. forward, downward and inward beyond the plane of the right eye. By measurement with the exophthalmometer, the right eye was 17 mm. and the left eye 22 mm. out from the planes of the outer orbital margin. Movement of the left eye upward and outward was almost *nil*. Ophthalmoscopic measurement of the left eye was then +6D., being double that revealed two and one-half years previously. Tumor of the optic nerve was suspected and operation advised. An *x*-ray picture did not reveal any evidence of sinus involvement, or solid tumor in the orbit.

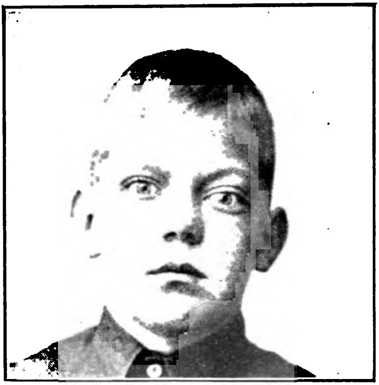
On Dec. 5, 1916, under general anesthesia, a vertical incision about 30 mm. in length and 5 mm. external to the cornea, was made through the conjunctiva and capsule. The external rectus was elevated on a hook, and black silk sutures passed through the muscle near its attachment. The muscle was then severed and drawn outward. Dissection backward, close to the eyeball, soon brought into view a smooth, round mass, 12x18 mm., that appeared to be cystic. The growth was firmly attached to the sclera around the optic nerve entrance to the eyeball, and enveloped the nerve for about 18 mm. toward the optic foramen. The cyst was easily separated from the surrounding tissues.

While endeavoring to detach the tumor from the sclera it was ruptured and clear fluid escaped, permitting the collapse of the cyst. The optic nerve was then exposed and severed close to the ball. A section of the nerve with the cyst wall attached was then removed. The external rectus muscle and conjunctiva were then stitched back in place, the eye closed, and a compress applied. The eyeball having been pushed forward during the development of the cyst and the ball flattened anteroposteriorly, the drawing of the ball toward the nose gave ample space for observation and dissection without disturbing the outer orbital wall. There was but moderate reaction from the operation. The stitches

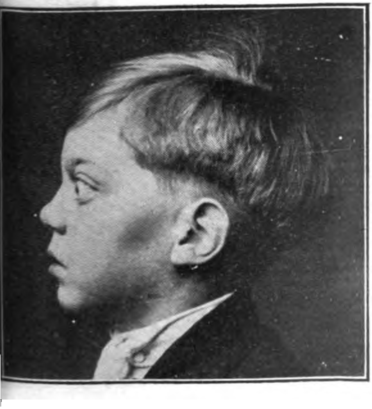
PLATE VII.



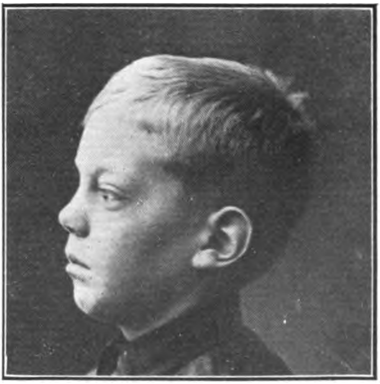
Cyst of optic nerve sheath. Bane's case. Front view before operation.



Same case nine months after operation.



Cyst of optic nerve sheath. Bane's case. Side view before operation.



Same case nine months after operation.

W. C. Bane, page 85.

were removed on the sixth day. A compress was kept applied for three weeks, to support and encourage retraction of the ball.

Upon omitting the pad and permitting of exposure of the eye, there developed an ulcer 1x2 mm. on the cornea, near the temporal margin. The ulcer healed in six days, the compress having been resumed. For several months following the operation there was manifest an edematous condition of the tissues where the incision was made. So persistent was the edema, that the writer entertained the thought that there was an exudate forming in the orbit from some remains of the cyst wall. The edema has now disappeared. The blood-supply of the retina does not appear to have been disturbed by the severing of the nerve. Possibly collateral circulation was established during the pressure of the cyst contents on the optic nerve. The movements of the eye are yet somewhat limited. The photographs were taken just previous to the operation, and months afterward (Plate VII).

The pathologic findings were:

The specimen included the optic nerve and collapsed cyst wall which surrounds it. The section of the nerve measured 11 mm. in length and 2.5 mm. in thickness. The thickness of the specimen which was nearest the globe and included the nerve and its sheaths, measured 1 cm. The posterior portion, 11 mm. from the globe, is 7 mm. in thickness. Specimen fixed in Zenker's fluid and imbedded in celloidin.

Microscopic examination: The optic nerve fibers are atrophic. The septal fibers have not increased in number or in thickness, but seem closer together than normal. There has not been an invasion of the connective tissue into the nerve. The vessel walls have not increased in thickness but are, possibly, a little smaller than normal. The arachnoidal sheath is not thickened; its relation to the nerve is normal, and it is covered only with a single layer of endothelium.

The pial sheath presents a honeycombed arrangement. There are numerous small fibrous cords covered with a single layer of endothelial cells.

The dural sheath is thickened; its inner covering a greatly thickened layer of endothelial cells. This thickened endothelium is more pronounced in the anterior portion of the specimen, and gradually thins to ten or twelve layers of cells in the posterior portion. The endothelium in the anterior portion fills the space between the pia and dura, and has a whorled appearance. In this thickened endothelium a few blood-vessels are seen. They are only endothelial tubes filled with blood. The fibrous portion of the dura is also markedly thickened.

THE OCULAR MUSCLES.

Retraction Movements of the Eyeball. A man, aged 19, always had divergent squint of his left eye, with which he could see well. Four years previous to consulting J. Witmer,[7] he had a febrile disease with headache and loss of consciousness. Since then the vision of his left eye was impaired and he had nystagmus. The author reports that right eye showed normal movements. The left eye can be moved only slightly upward from the medium position, and pretty far downward, without retraction. Adduction and abduction are completely missing. In looking to the right the left eye moves downward and is retracted into the orbit by 3 mm. Both eyes are then seized by nystagmic oscillations. The left lower lid at first retracts a little with the eyeball, then stops, so that a fissure is created between the lid and the globe. The upper lid scarcely participates in the movement. The left palpebral fissure is not narrower than the right.

A tenotomy of the external rectus and an advancement of the internal rectus were performed. The external rectus was converted into a tendinous, perfectly unelastic, band, and the internal rectus into an elastic formation containing muscular tissue, of which however it could not be said with certainty, whether it was contractile. The superior rectus was also impeded in its action, the inferior rectus had normal function.

That in looking to the right, only retraction, not adduction, took place is explained by the tense fixation

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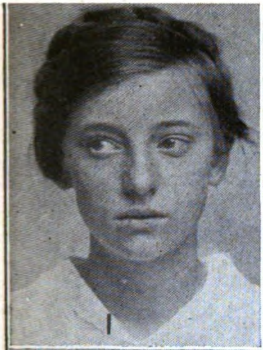
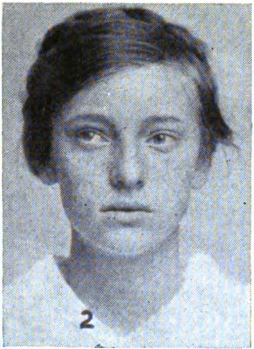
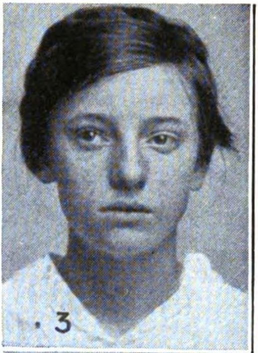
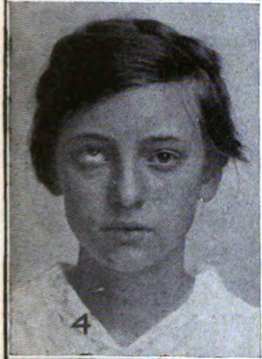
(7) Archiv. f. Augenhlk., vol. 81, p. 200.

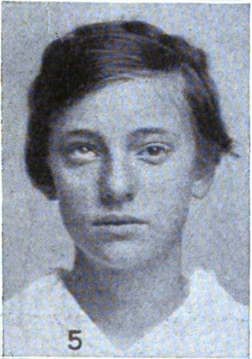
PLATE VIII.

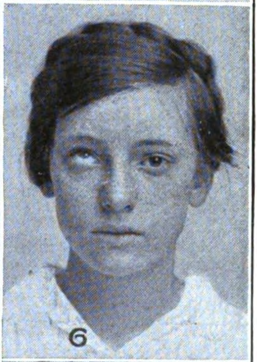


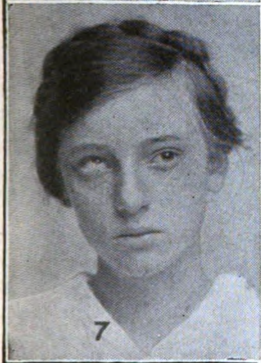


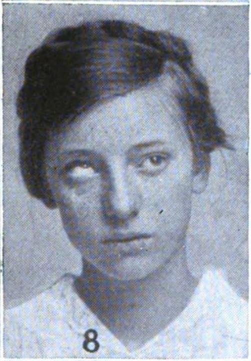


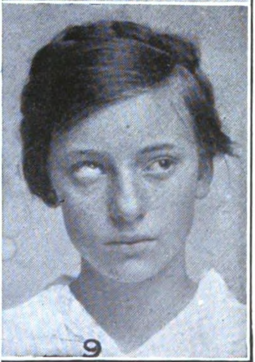




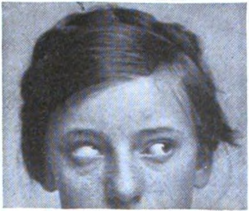








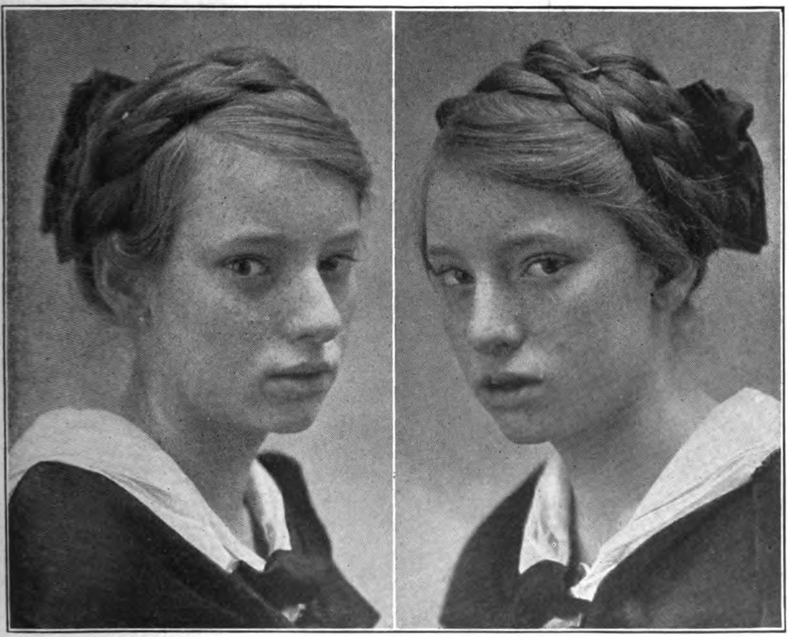
These illustrations show the continually increasing deformity of the right eye, caused by overaction of the inferior oblique as the patient looks from the extreme right to the extreme left.



Note the gradual upturning of the right eye, and that while there is an apparent convergent strabismus, in reality as related to the other eye it is divergent.

Deviation upward of one eye.—Frank C. Todd, page 91.

PLATE IX.



After operations extreme rotation to the right.

After operations extreme rotation to the left.

Deviation upward of one eye.—Frank C. Todd, page 91.

by the external rectus at the temporal side, so that the internal rectus became a retractor. At each attempt at adduction there was a rotation downward, apparently due to a simultaneous contraction of the inferior rectus, aiding in its quality of adductor the insufficiently functionating internal rectus.

The etiology of the disease of the muscle was not known. The author calls attention to the occurrence of hemorrhages in the ocular muscles of the newborn, which might damage the muscular fibers and produce cicatricial changes of the muscle. For this supposition seems to speak a case of retraction movement due to traumatism of the ocular muscles, presented by Lauber. The chief cause for the motor disturbances seemed to be hemorrhages in the ocular muscles, with secondary changes of the muscular tissue. One must also think of intrauterine inflammations of the ocular muscles as a cause for the conversion of muscular fibers into connective tissue.

The review shows the insertion of the internal rectus farther back, and the tendinous alteration of the external rectus with normal insertion.

Synchronous Movements of Eye and Jaw. Paul H. Kleinhans,[8] at a meeting of the Wills Hospital Ophthalmic Society, presented a boy 11 years of age with synchronous movements of eye and jaw. The mother had noticed from birth that the upper lid of the right eye drooped and some years later it was remarked that the movements of the mouth in chewing were always connected with an up-and-down movement of the right eyelid. There was no family history of a similar anomaly.

Examination showed in the primary position almost complete ptosis of the right lid. On opening the mouth, the lid shot up. Lateral movements of the jaw had no effect on the lid. Examination showed insufficiency of the right superior and internal rectus muscles. There were no fundus changes, and vision in each eye was normal.

W. C. Posey said that cases of this nature were quite rare, and recalled a case of a Hebrew girl, 17 years old,

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(8) Ophth. Record, April, 1917.

which he had reported to the College of Physicians some years previously. In this case the right lid had drooped from birth and it was learned that since earliest childhood it had been remarked that when she chewed or rotated her jaw, the lid of the right eye would move up and down. There was an associated overaction of the right superior rectus muscle, due to insufficiency in the right inferior rectus. Sinclair, who had written an able treatise on the subject in 1895, had found the most common class of cases of this kind to be those in which certain movements of the lower jaw are associated with an upward movement of the upper eyelid. In this class there is one-sided congenital ptosis, with or without paresis of the superior rectus. The drooping eyelid can not be voluntarily raised, but is vigorously raised when certain movements of the lower jaw occur. Sinclair further subdivided the cases in this series into four sub-heads:

Group I.—Cases of one-sided congenital ptosis in which the drooping eyelid is raised both when the mouth is opened (digastric) and also when the jaw is directed to the opposite side (external pterygoid).

Group II.—Cases of one-sided congenital ptosis in which the drooping eyelid is raised when the jaw is depressed, but is not raised with lateral movements of the jaw.

Group III.—Cases of one-sided congenital ptosis in which the drooping eyelid is raised with lateral movement of the jaw (external pterygoid action), but not with simple opening of the mouth.

Group IV.—Cases in which similar associated movements of one upper eyelid with movements of the lower jaw occur, but in which there is no ptosis.

The explanation of the association is difficult and must be purely hypothetical, as no cases as yet have come to autopsy. The theory which is usually accepted is that the levator receives nerve supply from the motor nuclei of the fifth nerve as well as from the nuclei of the third. Others have thought of a nuclear connection between the third and seventh nerves, and there are still others who presuppose a connection between the nuclei of all three nerves. While there is ground for belief in the imperfect development of the third nerve nuclei in a number of the cases, as is evidenced by insufficiency in the action of superior and inferior rectus and other muscles supplied by that nerve, this is not true of all, for, as has been stated above, other cases have been cited where all the muscles supplied by this nerve performed their functions normally, the associated movements between the lid and jaw being the only anomalous conditions present.

William Zentmayer noted that when the gaze was directed below the horizontal plane the left palpebral fissure became of the same width as that of the right side and continued so in complete infraduction. Associated movements between the eyes and other facial muscles, especially between the orbicularis and the alae of the nose are said by Harmon to be very common. Harlan, some years ago, showed a case allied to the one exhibited by Kleinhans in which blepharospasm was induced by jaw movements.

Burton Chance said that the number of cases exhibiting jaw winking are so few that every opportunity should be taken to place on record any instances of the syndrome whenever they occur. The case exhibited today recalled to his memory one which he had had in his private practice a number of years ago, all the features of which he could not exactly recount, but it differed from today's case, and from the majority of those systematically reported, in that instead of there being present a ptosis which disappeared when the mouth was opened, his case showed drooping of the lid during mastication. The patient was a comely girl of 19, in whom the defect could not be observed except when she was eating.

Deviation Upward of the One Eye, Due to Overaction of the Inferior Oblique, Consecutive to Congenital Paresis (or Insufficiency) of the Superior Rectus of the Other Eye. Frank C. Todd[9] presented (and illustrated by the cinematograph) the following case:

On July 13, 1916, Bertha K., aged 13, gave the following history: Deviation of the eyes was first noticed when patient was 6 weeks old. It was then not con-

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(9) Ophth. Record, June, 1917.

stant, but appeared when she looked in certain directions. It became increasingly noticeable. She was fitted with glasses when 5 years of age, and wore them three years without correction of the deviation.

In answer to inquiry, patient stated that she was not bothered with double vision, except when her vision was directed toward a near object (when convergence was required). But the mother stated that she was continually running into things, particularly when they were on the right side, and that the family had observed that the head always assumed a certain position, *viz.:* a tilting to the left and a turning toward the left. The parents had, however, not associated the head position with the eye defect.

EXAMINATION.

Versions.	Up.	Down.	Out.	In.	Vision.
Right	60	30	50	65	R.—6/9—6/6+2.00
Left	50	45	40	65	L.—6/5—6/5+0.50 () + 0.50 ax. 90

On looking at the moving picture it was observed that when the patient was asked to fix the eyes on the camera and turn the head toward the left, the eyes were parallel; then, as she slowly moved the head toward the right, while the left eye continued to fix, the right eye turned upward; and, as related to the left eye, it deviated somewhat outward (Plates VIII and IX).

It was found that the deviation upward amounted to about 25 degrees, and outward to a maximum of about 15 degrees. Then, if the patient was asked, while the head was in this position, to fix with the right eye, the left eye would drop downward and outward to a corresponding degree. The patient has partial suppression of the image, so that tests could not be made with the Maddox rod, and had to be made with the cover test.

Diagnosis. "This is a case of congenital insufficiency (paresis or muscle anomaly) of the left superior rectus, and secondary deviation upward of the right eye, caused by compensatory overaction of the inferior oblique. Tilting of the head produced parallelism and consequently the head almost continually assumed this position."

Operation. On July 21, a complete myotomy of the right inferior oblique, according to the method described by Duane, was performed under general anesthesia. On August 2, measurements showed some improvement, but still considerable deviation. On August 3, under local anesthesia, the conjunctiva was re-opened under the right eye, and an exploration made to determine to a certainty whether or not there were any remaining attachments. It was found that the inferior oblique had been completely severed. The superior rectus of the left eye (the paretic or insufficient muscle) was advanced by a tucking operation. The results from this operation proved satisfactory, and parallelism was secured, while the tilting of the head was completely relieved. The patient was allowed to go home on August 15, promising to return again in a month. The patient did not return, but Todd received a letter from her dated November 27, in which she says: "I do not see double, and my eyes are straight."

Duane called attention to this condition in a paper published by him in the *Annals of Ophthalmology*, October, 1904, and again in the *Archives of Ophthalmology* in 1916, in which he reports having performed tenotomy of the inferior oblique for this condition with relief in several instances.

Relief in this case only followed advancement of the paretic muscle.

The characteristic symptom, which may be first evident to the friends, is the tilting of the head, although in some cases a secondary lateral (either divergent or convergent) stabismus may result. To quote from Duane: "When head-tilting fails to give relief, and partial or complete suppression has not occurred, the patient often involuntarily adopts the expedient of diverging or converging the eyes, until the double images are so far apart as to be no longer confusing. In this way, at the age of 2 or 3, or perhaps later, a squint develops. Of the cases of acquired convergent and divergent strabismus that I observed, quite a fair proportion have developed in this way, the acquired lateral squint being secondary to the congenital vertical deviation.

"In making the examination, it may be found that the patient may fix with either eye, but in the case of an insufficiency of the superior rectus of the left eye, and a consecutive overaction of the right inferior oblique, when the object looked at is carried so far to the left as to be hidden from the right eye by the nose, and at the same time is carried somewhat up—the left eye, which now has to fix, would tend to lag down, and the right eye would tend to shoot obliquely up.

"A final proof that the upshoot of the right rotation was due to spasm of the inferior oblique and not to any peculiarity in the insertion of the internus, would be afforded by the fact that when the eyes converged strongly, the right eye, although turned strongly in, does not shoot up, but does so at once when *both* eyes are turned to the left."—(Duane.)

If the case is one of paresis of the right inferior rectus with consecutive overaction of the left inferior oblique, the effect would of course be the same, but the various faulty movements described would be transferred to the other eye.

In case binocular vision is present, tests may be made with the red glass and the tangent screen of Duane.

These cases should be operated on early, thus obviating the disfiguring wry-neck or strabismus, which may otherwise result.

TOXIC AMBLYOPIA.

Acute Inflammatory Glaucoma Produced by Instillation of One Drop of One Per Cent. of Homatropine. In reporting this case, M. J. Levitt[1] points out the danger in the use of even mild mydriatics, as homatropine or cocaine, in elderly people. If a mydriatic is used, it should immediately be followed by 2 per cent. of pilocarpine or 0.5 per cent. of eserine. If an acute glaucoma has unfortunately been set up the treatment described in the following case will give the best results and in many cases will restore the eye to its normal state.

"Mrs. O., a patient of mine for a number of years, while suffering from an acute attack of heart or kidney

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(1) New York Med. Jour., Aug. 25, 1917.

trouble, requested me, by the advice of her family physician, to examine her eyes for possible hemorrhages in the retina. External examination revealed the following: Pupils three millimeters, equal and reacted well to light and accommodation. Tension: right eye was —1; left eye normal. In order to get a good view of the retina, I instilled one drop of 1 per cent. of homatropine as is customarily done by every ophthalmologist. The medium of the right eye was a little hazy, the blood-vessels much thinner than in the left. There were no hemorrhages in either eye. After the examination, I instilled a drop of 2 per cent. of pilocarpine in each eye and left the patient. In forty-eight hours the nurse reported to me that the patient's right eye was congested, that she could not sleep well at night, and was complaining of severe pain in the right eye and in the same side of the head. Upon examination of the patient, I found that the cornea was hazy, the pupils were irregularly dilated and immobile; there was ciliary injection, tension was +3. The anterior chamber was very shallow; the patient's eyesight was reduced to distinction of light and darkness. In other words, the patient presented a typical case of acute inflammatory glaucoma."

Energetic treatment was immediately instituted. A subcutaneous injection of a quarter of a grain of morphine was ordered, and a combination of 0.5 per cent. of eserine and 2 per cent. of pilocarpine was to be instilled every two hours, and ice application to the eye and same side of the head for twenty-four hours. The patient had a restful night. The next day the pupils were greatly contracted, not evenly—rather oval. The patient had no pain and could see fingers with right eye for a distance of ten feet but complained of blurring of vision. Eserine and pilocarpine instillations were continued three times daily for two days. Three days later there was no pain and vision was fully restored. Drops were ordered put in every night for three nights, then every other night for a week.

Fuchs states that not only mydriatics, like atropine, can excite acute glaucoma, but also homatropine or even cocaine in an eye that is predisposed to it. The most interesting feature of this case is that the right eye had tension —1, was myopic and generally considered immune to glaucoma, and in spite of every precaution an acute inflammatory glaucoma set in.

[In estimating the rôle played by mydriatics in an acute attack of glaucoma, at least two points should be kept well in mind. First, the possibility that the instillation of a cycloplegic or mydriatic may be followed by such an attack as a *mere coincidence*. Cases of homatropine glaucoma are extremely rare in persons under 30 years of age, and one of the reasons must be that glaucoma, itself, is rarely found in subjects under that age.

The second, and probably the most important, consideration is the incidence of an attack in which the mydriatic merely acts as a determining cause—probably in subjects that would have had, eventually, marked increase of tension, even if the pupil had not been widely dilated.

It is the belief of the Editor that in *genuine cases of homatropine glaucoma*, the early use of eserine, massage and saline catharsis brings about a permanent cure. Where, however, the instillation of the drug and the acute attack are coincident only, the disease will probably re-occur and will require a prolonged course of treatment.—Ed.]

Blindness from the Industrial Use of Wood Alcohol. This subject is discussed by J. M. Robinson.[2] T. P., aged 29, a Greek of good physique, was referred, June 1, 1917, to his ophthalmic service at the Duluth Free Dispensary because of some difficulty which an optician had had in fitting the man with glasses. Complaint was made that objects looked smoky, and that the sight of the left eye had been failing for six weeks. Vision of the right eye was 20/30 and J.2; the color fields were much contracted; the field for white was moderately reduced on the nasal side, and greatly contracted on the temporal side. No definite scotoma could be located. The optic disc showed possibly a slight pallor. Vision of the left eye was reduced to fingers at 1 foot, except in the upper temporal quadrant, where fingers could be counted at 12 feet. The disc on this side was distinctly

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(2) Jour. Amer. Med. Ass'n., Jan. 19, 1918.

pink—a capillary congestion. Neither at this time nor later was there increased tension of either eye, or changes in the media or fundi beyond the discs. The vessels remained of normal caliber, with no swelling nor cupping of the nerve heads. The pupils were equal, and noticeably large, the dilatation being marked in reduced light; reaction to accommodation and light was equally sluggish. Twelve days later the vision of the right eye had fallen to 20/70, at which point it remained for about a fortnight, and then sank with the left, so that by September 15 the bare detection of finger movements was the best that either eye could do. Both optic discs in the meantime had become very white.

The family history was negative. The father and mother and nine brothers and sisters were all living and in good health. There had been no visual trouble among the grandparents, as far as known. The personal history was clear up to April 1; no injury, and no illness other than the usual diseases of childhood. Syphilis was denied, and evidences of it were lacking. The patient's wife was well, in her first pregnancy, and since has been delivered at term of a healthy child. The Noguchi test was negative. There was no ataxia. The patellar and other reflexes were normal. There were no signs of tabes or paresis. The teeth, tonsils, nasal accessory sinuses, gastro-intestinal and renal functions and the pituitary and thyroid glands were all given consideration.

The man had worked as a railway warehouseman up to March 1, at which date he obtained employment in a shoe-shining and hat-cleaning shop connected with a cigar stand. Here he worked for two or three hours each day dyeing hats with a commercial product called "Colorite"—a black liquid dye with a rather faint yet distinct odor of wood alcohol. The place was fairly well ventilated; there was also a door which was very frequently opened on the street. The temperature was about 70° F. His hands were spattered and stained black "about a quarter of the time." After five or six weeks of this he first began to note that objects looked smoky, while coincidently he became easily tired, perspired freely, and suffered slightly from nausea and a somewhat vague "stomach trouble." There was slight headache and dizziness, which, however, eventually disappeared. These symptoms were more or less pronounced when he came under Robinson's observation after six weeks. When last seen he was once more in good health, but totally blind. This picture is, Robinson believes, fairly typical of wood-alcohol poisoning of the slow type. To make it a more perfect case, the findings should have included a scotoma, and "contracted retinal vessels," perhaps.

An original bottle of "Colorite," of which the man had used a dozen or more, was sent to the Bureau of Labor Statistics, Department of Labor. An analysis made at the Hygienic Laboratory disclosed 4 per cent. of wood alcohol, the coloring matter being reported as one of the indulin group, negrosin. Though aniline black, as well as other of the aniline dyes, may sometimes be classed as poisons, and have been known to exert deleterious action on the cornea and conjunctiva, no instance of nerve atrophy has been reported as following the use of any of the indulins. The man polished few shoes: nitrobenzene seemed not to be a possibility. The wife and fellow workers stated that he was an abstainer from alcoholic drinks.

Dangers of Wood Alcohol: In reporting one of the formidable series of imbibition cases from Russia subsequent to the abolition of vodka, Yakovleva calls attention to the cumulative action of the poison. Tyson and Schoenberg refer to over 100 cases of death and blindness, up to 1912, following the inhalation of wood alcohol. Buller and Casey Wood, in their review of the subject, say, "It is also highly probable that in susceptible subjects repeated or even single methylated 'alcohol rubs' may produce poisonous symptoms, through absorption of the spirit by the skin." A few cases put on record since that report have corroborated this view. Campbell mentions a patient who had his chest bathed once daily for two weeks with wood alcohol, resulting in light perception only in one eye, and vision 15/20 in the other, with contracted field. Woods reported sudden blindness coming on in a man who had rubbed his legs with wood spirit each day for a month. Ziegler mentions an instance in which a temporary amblyopia followed exposure to the fumes of wood alcohol for only one hour daily over a month's period. The findings of Loewy and von der Heide that as small an amount of methyl alcohol as 0.2 per cent. in the inspired air may lead to absorption in the body in not inconsiderable quantities indicates the possible danger that exists in even a moderate exposure to the poison.

In a report relative to the possibility of poisoning taking place when the proportion of methyl alcohol is as small as 4 per cent., Dr. Alice Hamilton quotes von Jaksch to the effect that workers with denatured alcohol have shown symptoms of wood-alcohol poisoning; Kobert, who says that the disturbances of health complained of by these workmen are to be attributed in part to the piridin bases used in denaturing, and in part to the wood alcohol, and Goldsmith, who agrees with Kobert, and who states that there was so much ill health and discomfort complained of by the men working with denatured alcohol that the workers sent petitions to the Reichstag, in consequence of which an inquiry was ordered.

Lewy reports that for the time during which in Austria denaturing was done by means of a 2 per cent. admixture of wood alcohol and 0.5 per cent. piridin bases (the present U. S. Internal Revenue Formula 2), there were so many reports of sickness caused by the use of alcohol so denatured that the ministry undertook an investigation in Bohemia, where many of the Austrian industries are located. The report emphasized the fact that wood alcohol was being used as the denaturant in place of pure methyl alcohol, and that wood spirit contains large quantities of acetone, aldehyd, allyl alcohol, methyl acetate, and other volatile compounds, all of which are toxic in a higher or lesser degree; but the report admitted that the effect of methyl alcohol was undoubtedly the principal one. There were at that time a number of cases of amblyopia among the Bohemian workmen who had been using denatured alcohol.

The U. S. Internal Revenue regulations prescribe two general formulas for denaturing: the one, as mentioned above, a trifle less than 2 per cent. wood alcohol, while

Formula 1 provides for 10 parts of this spirit and 1 part of benzene to 100 parts of ethyl alcohol, each by volume—a mixture which, though suggested by no less authority than Wood, would seem from the Austrian account to be fairly dangerous. It has also been set forth as an argument in favor of the use of wood alcohol as a denaturant that a 10 per cent. "methylated spirit" has for a long time been used in Great Britain, and that no case of amaurosis has been reported from its industrial use. The writer spent part of his apprenticeship in the English clinics, and again more recently was relief house surgeon at Moorefields. The vast majority of British workmen who live in or near the large centers go to the hospital clinics for their eye treatments; the clinics are usually crowded; the time for investigation is limited, nor is it common practice to follow the dubious case back to the home or workshop. It was found in reviewing the histories of 300 optic atrophy cases—an opportunity afforded through the courtesy of some of the Moorefield staff—that even when the aids of Wassermann, Roentgen and Onodi had been taken advantage of, 15 per cent. of the optic nerve degenerations remained unexplained.

[The Editor still believes that it has not yet been proved (*i. e.*, there are no well-authenticated cases) that drinking British methylated spirits has produced the blindness typical of wood-alcohol intoxication.—Ed.]

Quinine Amaurosis. In addition to reviewing the history and clinical aspects of the usual form of quinine amaurosis, and relating what is known of its pathologic histology, A. J. Ballantyne[3] reports a case which differs from the majority of those hitherto published, in that, although the patient was first seen four days after the administration of the quinine, a further period of five days elapsed before the characteristic ischaemia of the disc and retinal vessels made its appearance, a feature which he assumes may have some bearing on the pathogenesis of the condition.

In summarizing, the writer says:

1. In quinine poisoning complete loss of vision may be found in association with a normal condition of the

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(3) Brit. Jour. Ophth., March, 1917.

fundus oculi, and that there may be a striking recovery of vision in spite of the presence of well-marked fundus changes.

2. In all, or nearly all, cases of quinine amaurosis, ophthalmoscopic changes, such as congestion of optic nerve and retina, pallor of the disc, narrowness of the retinal vessels, and cloudy opacity of the retina, make their appearance sooner or later, but there is no correspondence between the character of severity of these changes and the intensity of the visual defect.

3. The visual defect can not, therefore, be due to such changes, but rather to a condition of the retinal elements invisible with the ophthalmoscope.

4. This change may be induced, or aggravated; in the first place, by ischemia due to contraction of the vessels of the optic nerve and retina, but is, in the main, the result of a direct toxic action of quinine upon the retina itself; and the ultimate recovery of central vision, with loss of peripheral vision, and failure of vision in twilight, suggests a selective action of the poison upon the rods.

GLAUCOMA.

Pathology of Glaucoma. In giving his exhaustive account of this subject, C. Zimmermann[4] remarks that in Egypt A. F. MacCallan found, instead of 1.6 per cent., 2.3 per cent. of glaucoma simplex, the small cornea of the Egyptians being supposed to predispose the eye to glaucoma. This is in accordance with the observations of Priestley Smith, who found the cornea, as a rule, smaller in glaucomatous eyes (at an average 11.1 mm. horizontally, 10.3 mm. vertically, against 11.6 mm. horizontally and 11 mm. vertically), than in non-glaucomatous eyes. Smith assumes that the smallness of the cornea predisposes to glaucoma by the diminution of the perilenticular space through the resulting changes of position of the ciliary body.

The alterations of the *cornea* itself are caused by congestion or inflammation or both, and appear as edema due to increased transudation from the marginal vascu-

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(4) Ophthalmology, July, 1917.

lar loops, subepithelial infiltration with lymphocytes, new formation of connective tissue and blood-vessels, producing pannus glaucomatosus. Alt found a glaucomatous pannus of the upper half of the cornea of half the thickness of the cornea, consisting of dense connective tissue with numerous blood-vessels over Bowman's membrane, farther downward formation of blebs between the epithelium and the intact Bowman's membrane. As Fuchs showed, the edema of the superficial layers of the cornea may extend through the canals of the nerves penetrating Bowman's membrane under the epithelial covering and lift it up in form of blebs leading to keratitis bullosa. Besides cones of epithelial cells propagated into the new formed pannous membrane, nests of separated epithelial cells were found in it. They form the anatomic base for the small white spots, which may occasionally be noticed on the living cornea.

Descemet's membrane may show deposits containing albumin and fibrin, leukocytes and pigment. In hydrophthalmus the cornea is generally thinned, the opaque epithelium separated from it by fluid, and Descemet's membrane ruptured in consequence of hypertension, frequently showing pigment inclosures. They were first described by Haab, who utilized them as differential diagnostic signs from megalocornea and cornea globosa. Recent investigations by Stähli revealed that the ribbon-shaped opacities are due to ruptures of Descemet's membrane and occur in more than three-fourths of all hydrophthalmic eyes. Hence they are a most valuable diagnostic sign of infantile glaucoma in later life, and the central opacities are a very important, so far neglected, element for the impairment of central vision, which Stähli found reduced to one-half or one-third. The ruptures are gaping by the receding edges and later filled with hyaloid substance from the endothelium and endothelogenous tissue from proliferation of the endothelia. These increase in number and form a massy cellular tissue with fine fibrillar and granular intercellular substance which is subject to secondary shrinking. Frequently the endothelia contain pigment from the ciliary body or iris.

In consequence of the increased tension the *sclera* shows general atrophy and subsequent diminution of elasticity. At the places of transit of the vessels cellular infiltrations of the vascular sheaths and the surrounding parts of the sclera have been observed. Heerfordt found in three eyes, affected with inflammatory glaucoma, the part of the wall of the scleral canal lying toward the sinus of the vortex veins intercepted by the blood current and bent into the opening of the scleral canal, so that it obstructed the blood passage like a valve. He calls this part the sinoscleral plate and considers its formation as etiologic factor in hemostatic glaucoma. Accordingly, a congenital predisposition to acute inflammatory glaucoma consists in the thinness of this plate in connection with ectasia of the scleral canal, so that it can be easily mobilized. The predisposition may be acquired by laxity of the chorioid, which makes a receding or superposition of the sinus possible. Congenital predisposition to chronic inflammatory glaucoma consists partly in predisposition to lymphostatic glaucoma, partly in congenital superposition of the sinus or ectatic venous branches.

Bartels concluded from his elaborate investigations that diseases of the *blood-vessels* in glaucomatous eyes are very frequent, but mostly not beyond the scope of arteriosclerosis. They have nothing specific and nothing characteristic of glaucoma. There is no doubt that in glaucoma primary inflammatory changes of the blood-vessels occur at the anterior segment of the globe and the central vessels of the optic nerve, but it is undecided whether the observed changes are not exceptions. In Bartels' cases, the narrowing of the intrascleral sections of the anterior ciliary arteries and the expansion of the posterior ciliary arteries were striking. The alterations found in glaucomatous eyes furnish no sufficient cause for rise of tension for any part of the eye. So far the ectatic perforating anterior ciliary vessels which one occasionally sees in eyes suffering from old glaucoma have been regarded as veins. Heerfordt showed that they are ectatic veins and arteries.

Löhlein found in none of twenty different cases of primary glaucoma, carefully examined with various chemical and biologic methods, an increase in the *adre-*

nalin content of the blood serum and calls attention to the numerous possible errors in these examinations which had led Kleczkowski to directly opposite conclusions.

Obstruction of the *sinus of the anterior chamber,* through which the aqueous flows out from the eyeball into the canal of Schlemm, must necessarily augment the contents of the globe and raise the intra-ocular tension, if not otherwise regulating influences effect a compensation. First, Knies and Weber showed the frequency and importance of the adherence of the periphery of the iris to the cornea in bringing about this condition. In accordance with this, Priestley Smith found adherence of the iris to the cribiform ligament or incarceration of the iris between this and the ciliary body in consequence of advancement and swelling of the lens. This occurs suddenly in acute glaucoma, gradually in chronic glaucoma. Ischreyt saw the same results from anterior adhesive iridocyclitis leading to adhesion of the root of the iris to the cornea without a special tissue between them. Elschnig presented anatomic examinations of six cases of adhesion of the intact anterior capsule of the lens to the posterior surface of the cornea, and organization of the exudation lying between, the anterior chamber being very shallow. Mostly it is due to ruptures of the cornea with direct agglutination, or organization of the exudation. A congenital adherence of the iris to the cornea may be caused by fetal inflammation or disturbances of development. While the older authors attributed the congenital anterior and posterior synechiae to inflammations during intra-uterine life, Peters, Makroski, Vossius, Seefelder, and E. von Hippel assumed that the common portion of the cornea and pupillary membrane remained unseparated at different places. Böhm found changes in glaucomatous eyes of children, aged 4 and 8 years, indicating intra-ocular inflammations; and in a child, aged 5, a typical arrest of development with subsequent ectasia of the eyeball.

The clinical diagnosis of a peripheral anterior synechia is of great importance, because iridectomy has a chance for a permanent result only if there is no firm adhesion between the root of the iris and the posterior wall of the cornea, as only then the purpose of the operation of liberating the normal efflux can be accomplished. Hesse therefore developed a new method of illumination, which allows a good view of the extent of the anterior chamber. A direct proof of a synechia in primary glaucoma and in two cases of glaucoma with deep anterior chamber and enlarged eyeball, similar to primary hydrophthalmus, was excellently demonstrated by this method. Verhœff found in ten cases of primary and secondary glaucoma sclerosis of the ligamentum pectinatum, *i. e.*, a general thickening of the network of the ligament with new formed tissue on its surface, dependent on a preceding anterior synechia at the periphery which had been separated. The detachment was effected by the traction of the sphincter pupillae in the early cases, by cicatricial retraction of the atrophied iris tissue in the older cases. He says, however, that the etiologic connection with glaucoma has still to be proved. Also Roenne observed in a typical case of glaucoma simplex sclerosis of the trabeculae of Fontana's spaces with deposits of pigment. Greeves described the invasion of the spaces of Fontana in or after iridocyclitis by granulation tissue containing capillary vessels, the tissue ultimately forming a solid mass of scar tissue, with which the pectinate ligament became incorporated. In another group of glaucoma cases the tissues of the pectinate ligament were unaltered, but the spaces were blocked by large swollen cells, apparently of phagocytic nature.

The *iris* may show foci of infiltration, inflammatory symptoms participating in the general inflammation of the whole uveal tract, and atrophy. Ectropium of the pupillary margin may follow from retraction of the organized inflammatory products on the surface of the iris toward the periphery, by which the pigment layer is exposed. The sphincter showed in all cases moderate or advanced atrophy. Often blood-vessels may be seen distinctly in the atrophic tissue of the iris. Their walls show sclerotic changes. Very recently Koeppe noticed with the Nernst slit lamp of Gullstrand in forty out of fifty cases of acute or chronic inflammatory primary glaucoma a more or less marked disintegration of the pigment epithelia and their descendent lump cells. It occurs as emigration of minute dark pigment in form of dust or coarse particles from the pigment cells, and transportation into the stroma of the iris, especially near the veins, the surface of the iris, the endothelium and the marginal portions of the cornea, to the anterior and posterior capsules of the lens, the aqueous, and the ciliary body, especially the lymphatic spaces and the adventitial lymphatic sheaths of the blood-vessels. These phenomena may also be observed in healthy eyes, but they arouse the suspicion of impending glaucoma. The suspected specificity of this pigment distribution for glaucoma was verified in five cases, in which the early diagnosis of glaucoma was made from these pigment changes, by the later clinical manifestation of glaucoma. Koeppe surmises that these changes may be of etiologic importance for glaucoma simplex by obstructing and obliterating the lymph channels, leading to gradual decompensation of lymph circulation, a lymph stasis and the picture of lymphostatic glaucoma. This may develop into hemostatic glaucoma by participation of the walls of the capillaries and veins. From a sudden rise of blood-pressure an acute attack of glaucoma may result. In concordance with Hamburger, Koeppe thinks that in the efferent paths of the anterior segment of the globe, besides the sinus of the anterior chamber, suction of the iris-sponge is of great importance.

The *aqueous* in glaucomatous eyes has been found especially abundant in albumin, and, as above mentioned, may contain pigment, and in consequence may be cloudy.

The *chorioid* and *ciliary body* show swelling, hyperemia, exudation, edema, interstitial inflammation, cellular infiltration, and atrophy, changes which originally led von Graefe to the opinion that glaucoma was due to serous chorioiditis. The *halo glaucomatosus* was found to be due to atrophy of the chorioid with loss of pigment.

The *vitreous* in acute cases is opaque from infiltration with round cells and pigment, and may show admixture of blood and liquefaction, and in the stage of degeneration may have disappeared entirely and be converted into fibrillar tissue.

In glaucoma the *anterior chamber* generally is shallow. Löhlein's studies showed that primary glaucoma with deep anterior chamber has so far been observed only in young individuals, *viz.*, in one-fifth of the cases of juvenile, not hydrophthalmic, glaucoma, mostly of glaucoma simplex; in another one-fifth the anterior chamber had normal depth. The eyes with juvenile glaucoma and deep anterior chamber generally show myopia, rarely emmetropia, never hypermetropia. Haag reported on sixty-seven cases of juvenile glaucoma with 111 glaucomatous eyes. Other pathologic conditions, especially general disturbances of nutrition, were very frequent. Inflammatory was twice as frequent as simple glaucoma; 31 per cent. occurred in myopia, 17 per cent. in myopia above 6.D., 28 per cent. in hypermetropia. Hence a predisposition to glaucoma in hypermetropia does not exist, but in myopia. Deep anterior chamber was more frequent in simple than in inflammatory glaucoma and occurred almost exclusively in myopic eyes.

Hereditary elements were frequently observed. From Haag's material no relations could be deduced which justify the assertion of an essential difference of juvenile glaucoma from glaucoma of adults. Löhlein sees in the combined hereditary transmission of juvenile glaucoma with high myopia a further support of the assumption of congenital hereditary anomalies in the structure of the eye. Out of ninety-two cases of juvenile glaucoma he found in more than 50 per cent. formations due to arrest of development or congenital anomalies which, in a number of the cases, proved to be directly or collaterally hereditary with the glaucoma, as persistent hyaloid artery, persistent pupillary membrane, anomalies of the retinal vessels, partial cataract, coloboma of lens, iris and optic nerve, strikingly small or large corneal diameter, signs of microphthalmus, excessive hypermetropia, etc., anomalies of development that were also, although not as frequently, observed as accompanying changes in congenital hydrophthalmus. Calhoun assumes that every case of glaucoma simplex under 30 years of age arouses the suspicion of heredity. Small size of the cornea and eyeball play an important rôle, of general affections, perhaps gout or rheumatism. Out of sixteen members of a family eight had glaucoma, two were suspected of glaucoma.

Defects of the Visual Field and Operative Methods in Glaucoma. The method of Bjerrum of examining the visual field with small objects of ivory at a distance of 2 m., instead of the usual practice at about 0.33 m., has the advantage, that hereby all linear measures are projected six times larger, hence the scotoma thirty-six times larger. Thus Bjerrum ascertained that one of the first symptoms of glaucoma is the occurrence of arch-shaped, resp. ring-shaped scotomas, starting from the blind spot, encircling the point of fixation and ending blindly in the horizontal line. The usual extension of Bjerrum's scotomas is toward the periphery.

Van der Hoeve[5] reports the clinical histories of six cases of glaucoma, which show that the scotomas may also spread toward the point of fixation, a much more dangerous occurrence, as hereby the macula is threatened. His observations led him to the following conclusions:

Bjerrum's scotomas may be totally or partially relative, and generally arise from the blind spot. After operations for lowering the tension they may disappear but may also become again absolutely relative. This recession not always occurs latest at the blind spot. Every patient, suspect of glaucoma, ought to be examined for Bjerrum's scotoma, also those with normal vision and normal borders of the visual field. Glaucoma patients ought to be treated with miotics or sclerotomy, if they can be further observed, with regard to tension and contraction of the visual field, including Bjerrum's scotoma, in order to meet alarming symptoms at once. Limitations of the visual field and Bjerrum's scotoma even in immediate neighborhood of the point of fixation are no contraindication against Elliott's trephining, so that this operation is especially adapted for such cases. On the other hand, one must weigh in every case of glaucoma to be operated on, whether iridectomy or sclerectomy is preferable.

The advantages of iridectomy are: slight or no dan-

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(5) Zeitschr., f. Augenhlk., vol. 34, p. 277.

gers for late infection simple technique. The disadvantages are: development of wound astigmatism, danger of injuring the lens, glaring through the large coloboma, difficult operation in shallow anterior chamber.

Advantages of sclerectomy are: less danger of the operation, no cicatricial astigmatism, no glaring, preservation of the sphincter, which is useful in later, mostly, however, unnecessary, instillations of miotics. Disadvantages are: greater complication and longer duration of the operation, and above all, late infection.

Although the writer is content with the results of sclerectomy in his reported cases and in patients with hemorrhagic glaucoma, he is more pleased if a patient leaves the clinic after the glaucomatous symptoms have been arrested by iridectomy than by sclerectomy. He thinks that iridectomy also in not acute glaucoma is to be maintained as the chief operation, and sclerectomy is only to be resorted to if iridectomy is contraindicated or has been without result.

Glaucoma as a Result of Herpes Zoster Ophthalmicus. The character of the aqueous humor in all cases of congestion or inflammation of the uveal tract, from whatever cause, is regarded as of importance by John E. Weeks.[6] In a case of glaucoma secondary to tuberculous uveitis, for instance, the writer obtained a decidedly positive test for globulin in the aqueous. Since his cases occurred in elderly individuals, in whom the anterior chamber was approximately two-thirds of its normal depth, it is probable that the lymph-space at the filtration angle was only large enough to take care of the normal outflow, although none of the patients had had any increase in tension before. When substances were added making the aqueous cells diffusible, an increase in tension was produced.

He reports three cases of *monocular glaucoma in herpes zoster.* The first was one of congestive glaucoma of the subacute type, complicated by herpes cornea. The second was a case of intermittent congestive glaucoma of moderate severity. The last was one of acute glaucoma. In all the cases, the nasal branch of the

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(6) Ophth. Record, August, 1917.

fifth nerve was involved. Operation was performed in all three cases because of the continued reduction in vision, and the persistence of other symptoms. The result was a cure in each instance.

EYEBALL AND ORBIT.

Bilateral Melanosis of the Eyeball and Face. A. Kestenbaum[6] describes an instance in the person of a woman aged 68, who showed an almost exactly symmetric melanosis of the lids, root of the nose, parts of the cheeks and temples to the hair border, the zygomatic arches, and the forehead above the eyebrows. It was more intense on the left side, where it was blackish grey, than on the right side, which had an ash grey color, besides numerous small brown or grey round nevi in the face. The melanosis extended to the lid border, became more intense at the posterior edge, and on the left side spread into the conjunctiva. The left lower fornix contained three dark-brown folds in its whole length. The upper ocular conjunctive was opaque from brown pigment dots. Most striking was the discoloration of the left sclera, encircling the cornea as an almost closed ring, partly 1 cm., partly 0.5 cm. wide. It was bluish almost like a staphyloma. Only at some places the intense brown color shown through. At the nasal and temporal sides the ring consisted of yellowish brown confluent spots. On the nasal side of the right cornea a larger number of brown spots was visible, on the temporal side the discoloration was slightly bluish. Upward a uniform blue area extended to the equator. No pigmentation could be noticed in the cornea.

The iris of both eyes was very dark brown, the left more than the right, and the fundus, especially the left, was intensely pigmented, but not the discs.

The hair of the patient was dark brunette. She stated that her father had dark brunette hair and her mother black hair, and both had very dark eyes. The excess of pigmentation seems to have been a consequence of summation of hereditary tendencies acting in the same sense.

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(6) Zeitschr. f. Augenhlk., vol. 34, p. 317.

A Case of Serous Tenonitis and One of Orbital Cellulitis. G. M. McBean[7] describes these two cases. A woman of 67 presented paralysis of the external rectus muscle, with accompanying edema of the ocular conjunctiva. There were also general symptoms of muscular rheumatism and high blood-pressure, which soon cleared up under potassium iodide and sodium salicylate. A month later she awakened one night with intense chemosis of the left ocular conjunctiva so that she could not close the eyelid. It was necessary to pass a couple of Snellen sutures through the lid in order to close the eye. Treatment with iodides and salicylates was continued, multiple puncture of the edematous conjunctiva was also resorted to and a pressure bandage was applied. In a few weeks the symptoms had gone except for a slight congestion of the conjunctiva. Her vision was not impaired.

A child of 3, for three days had a swelling of the left eyelid accompanied by marked proptosis and temperature of 100-102° F. There was some pain which was intermittent. Rhinitis on the same side with watery discharge was also present. Deep orbital probing through lid incisions above and below were made but no pus was found. A few days later a swelling formed in the region of lachrymal sac. It was incised and a drainage tube inserted, but no pus followed. The child recovered in a few weeks without any drainage of pus.

Operation for Contracted Socket. Burton Chance[8] exhibited a patient upon whom he had operated two days before for the repair of a contracted socket. The patient was a woman upon whom he performed the Maxwell operation to affect the lower lid, a year or so ago. The Maxwell procedure had yielded most satisfactory results in so far that the lower lid, instead of extending far into the floor of the orbit, had become sufficiently everted to give room for a modified glass eye. The transplanted island of cheek tissues had increased the cavity of the orbit in that locality by so much as the dimension of the island. The upper lid was so distorted and so matted and drawn up into the orbit,

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(7) Jour. Ophth. and Otolaryngol., March, 1917.
(8) Ophth. Record, April, 1917.

that the Maxwell procedure could not be considered suitable; but by the advice of Schwenk and with his assistance and direction Chance determined to undertake that procedure which Schwenk devised for the relief of a patient under his care in December, 1915, the principle of which consisted in the separation of the mucous membrane adherent to the orbital mass, by a submucous dissection, together with the subcutaneous dissection of the skin of the lid from the tarsal tissues, and in connecting the cavities thus formed by severing the intervening tarsal tissues. A new cul-de-sac was formed by uniting the interior surfaces of the mucous membrane and of the skin by means of three mattress sutures. An elliptical-shaped piece of sheet-lead was then inserted into the mucous cavity. Bandages were applied, and today, on the removal of the lead "conformer," a quite freely movable lid is present behind which is a distinct cul-de-sac.

Observations Upon Intra-ocular Tumors. Malignant growths of the eye are not only important in themselves, but also because of the light they are apt to throw on obscure parts of general pathology. A good prognosis can often be given to early diagnosis and enucleation. C. L. Rumsey[9] reports five cases. His first case was one of glioma in a child of 4. Enucleation; no recurrence. The glioma in this case began in the inner layers of the retina and grew inward, a condition he speaks of as glioma endophytum. The reverse order he calls exophytum.

His second case was one of sarcoma of the chorioid in a woman of 45. Enucleation; no recurrence. It is said that tumors with hematogenous pigmentation appear to be less malignant. This tumor was of that type.

The doctrine of Hirschberg that chorioidal sarcoma may be considered cured when patients remain healthy four years after enucleation is not always true as evidenced by contrary reports. Transillumination by the lamp of Würdemann for the anterior portion of the eye, and the diaphanoscope of Hertzel for the posterior portion of the eye are valuable for diagnostic purposes.

Case 3 was of a man of 34 who was thrown over a

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(9) Jour. Ophth. and Otolaryngol., March, 1917.

horse's head and upon arising found that he could not see with the right eye. Two months later, the author made a diagnosis of detachment of the retina. The eye showed pericorneal injection, shallow anterior chamber, tension +1, pupil dilated and no fundus reflex. The other eye was 10 D myopic. The right eye was enucleated and found to contain at the posterior pole a round and spindle cell sarcoma. The patient was lost track of after he left the hospital.

Case 4 was a man of 55 with a black growth 10×6 mm. covering the left third of the cornea and part of the sclera which was firmly attached. The growth was removed for study and was found to be an epithelioma and not a melanotic sarcoma as suspected. The eyeball was enucleated the next day; no recurrence.

Case 5 was a man of 67 who had had some surgical work done for a tumor of the left lower lid. The lid was ulcerated, extending from the middle lower border, involving the lachrymal sac and approaching the upper lid. Rumsey enucleated the eyeball, eyelid and lachrymal sac, making a lower lid after Ammon and Lagenbeck's method, and an upper lid after Fisch's method uniting the lids. Four and a half years later the patient returned with an ulcer of the upper lid of his other eye which followed a scratch of the skin. Radium treatment was used by Kelley resulting in a cure.

Photomicrographic reproductions are shown in the article.

PROTHESIS.

A Suggestion for an Improved Prothesis. T. J. Dimitry[1] says that he is not so well pleased with the results of a former "suggestion" as are many of his *confrères,* and, with a desire for improvement of the prothesis, has investigated some of its shortcomings.

Casey Wood, in the "American Encyclopedia of Ophthalmology," says: "With a large supply, both of the irregular ovoid reform prothesis, as well as the older shell plates to choose from, not to speak of the possibility of securing the service of a competent artist to make and adjust every unusual form socket, no patient can complain that he can not have a satisfactory companion for his remaining eye.''

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[1] (1) Ann. Ophth., April, 1917.

The above expression of the editor of this popular ophthalmic encyclopedia would leave us with the belief that we have reached an ideal; yet repeated observation of the patients convinces us that a more perfect cosmetic appearance may be obtained.

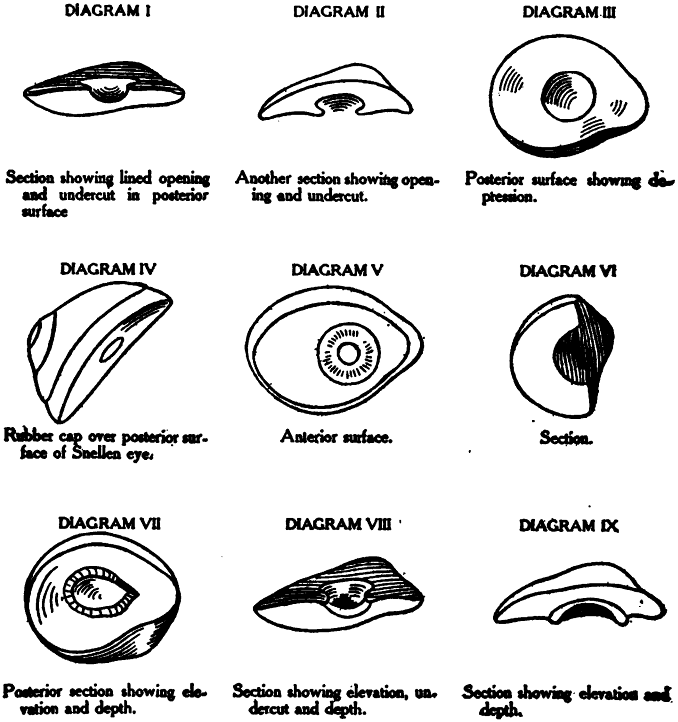

DIAGRAM I

Section showing lined opening and undercut in posterior surface

DIAGRAM II

Another section showing opening and undercut.

DIAGRAM III

Posterior surface showing depression.

DIAGRAM IV

Rubber cap over posterior surface of Snellen eye.

DIAGRAM V

Anterior surface.

DIAGRAM VI

Section.

DIAGRAM VII

Posterior section showing elevation and depth.

DIAGRAM VIII

Section showing elevation, undercut and depth.

DIAGRAM IX

Section showing elevation and depth.

Fig. 6.

The suggested improvement submitted in this contribution has been principally adopted from the plate used by dentists to which the teeth are attached. This plate of hard rubber is properly fitted to the roof of the mouth, the superior surface of the plate has a concavity which is to produce a degree of suction during the time of swallowing, and the plate is held in position.

The diagrams submitted (Fig. 6) will show the suggestions for this eye improvement. First, an artificial eye made of glass is used, the different shapes and contours being just as in the improved eye of Snellen, but on the posterior surface there is an opening about 4 to 12 millimeters in size. This opening is finished within as shown by diagrams 1, 2 and 3, and should be free from any sharp edges. The aim is to produce a moderate suction through the vacuum occasioned during the working of the lids. Rough edges are to be avoided, so as not to injure tissues. In a properly adjusted eye, correct size and shape, and chiefly when it is used, following one of the more recent ideas of procuring a more acceptable stump, it will grasp nicely the tissues and procure an effect much to be desired. It may be that the tissues may be affected by this slight suction, and a conjunctivitis may be the consequence. In certain larger centers, where the suggestions for a prothesis may be properly blown by a competent artist, it is thought better results are to be obtained.

Another suggestion in the development of a prothesis, and different from the above slightly, and possibly possessing the same advantages, has on the concave posterior surface of the Snellen eye an elevation, as of a dam around a concavity, shown in diagrams, 7, 8 and 9.

Still another plan suggested, which has met with a degree of dissatisfaction, is to use a rubber cap on the posterior surface of the Snellen eye. This rubber cap was procured from the top of a serum container, and used over the posterior surface of the plate. As shown in the diagrams 4, 5 and 6, a small hole is made for the rubber cap. This will cause a suction and hold the prothesis very nicely.

An Oculo-Palpebral Prothesis. When an eye has been severely burnt by molten metal, by a caustic alkali, or by a mineral acid, it occasionally happens that the lids and orbit are damaged so seriously that the ordinary artificial eye can not be worn. In such cases A. Maitland Ramsay[2] is in the habit of adjusting an ecblepharon

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(2) Lancet, May 12, 1917.

fitted to a spectacle frame. There is nothing original in the procedure, for it was known as long ago as the sixteenth century, and Ambroise Paré's works contain not only a description but also an illustration of that form of prothesis. Few references have been made to it in ophthalmic literature, because cases suitable for its use are of infrequent occurrence. The subject has, however, assumed considerable importance at the present time owing to the large number of soldiers who have been wounded in the head and face, and in some of whom the lids and orbit have been destroyed so completely that there is no possibility of the socket retaining an artificial eye. In such cases a carefully adjusted oculo-palpebral prothesis hides the deformity so satisfactorily that the wounded man can move about among his fellows without attention being drawn to the loss of his eye. He avoids, therefore, the annoyance of unnecessary commiseration, and is placed in a much more favorable position for obtaining employment. The esthetic value of the prothesis is, indeed, great, and it only requires the spectacles to be lifted to reveal the astonishing change in the appearance when the ecblepharon is removed. It goes without saying, however, that the aid of art ought never to be called in until the resources of plastic surgery have been exhausted, because if the socket can be repaired so that an artificial eye can be retained by the lids an infinitely more satisfactory result is obtained than that got from an ecblepharon, no matter how artistic and unrecognizable.

Each eye must be made to suit the individual case, and different materials have been suggested to replace the damaged lids. The most perfect imitation is obtained when the deformity can be covered by an oculo-palpebral prothesis made wholly of glass. Such an ecblepharon mounted on a silver plate and soldered to a spectacle frame is made by Müller, and in suitable cases it is so realistic that it is only detected after attention is drawn to it. Skilled artists in glass are not, however, always at hand, and different makers of the prothesis have mounted the artificial eye in procelain, in celluloid, in metal, and in various substances having gelatine as a basis. The drawbacks as well as the advantages of these different preparations are obvious. In the striking cases reported by Sir William Collins an extensive deformity was hidden by a copper-plate skilfully molded and painted, and to this a glass eye was attached. Coulomb and Ruppe advise vulcanite, and this is the substance that Ramsay has chiefly employed because of the ease with which it can be molded and painted to harmonize with the surrounding parts of the face. The parts to be reproduced are carefully modelled in wax, and from the model a plaster-of-Paris impression is taken. The soft rubber is then molded on the plaster-of-Paris and thoroughly vulcanized. The artificial eye is cemented to the vulcanite lids, and after these have been colored to match the surrounding parts the prothesis is attached to a spectacle frame. The lens in front of the sound eye corrects any error of refraction which may be present, while that in front of the artificial eye is of the curvature which is found to give the best cosmetic result.

The immobility of the prothesis is its most serious drawback, but that is a disadvantage which is also present in many cases in which an artificial eye is worn in the socket. It is important that all cicatricial contraction is as far as possible completed before the ecblepharon is adjusted, for if any further shrinking occurs a readjustment of the prothesis is necessary.

GENERAL DISEASES AND OCULAR SYMPTOMS.

The Ophthalmologist and the General Practitioner. This ever interesting and important subject is well discussed by M. J. Leavitt[3] under various captions.

Ophthalmia neonatorum: In spite of the propaganda that is going on, not only in the United States, but all over the civilized world, against ophthalmia neonatorum, one occasionally sees a baby with one or both eyes destroyed. We all know that Credé's prophylactic method of instillation of 1 per cent. of silver nitrate has reduced ophthalmia neonatorum from 10 per cent. to 0.1 per cent. Ophthalmia neonatorum is

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(3) New York Med. Jour., December, 1917, p. 1079.

not necessarily a gonorrheal infection. The secretion of pus in the eye should be examined for bacteria which can be easily carried out of the eye by any physician. Out of 200 cases of ophthalmia neonatorum the writer has found gonococci in only about fifteen cases. The treatment of ophthalmia neonatorum of a gonorrheal origin consists of very frequent cold applications, not ice, for the first forty-eight or seventy-two hours, until the inflammation subsides. Cleanse the eye with boric acid or bichloride 1:10,000. Apply silver nitrate to the upper and lower lid. If the discharge is very profuse, the application must be made twice daily. While argyrol and protargol are extensively advertised, they are inferior and can not take the place of silver nitrate. Examine the cornea daily. If the cornea looks hazy or has lost its lustre, it is better to call for help so that measures can be taken to save the eye.

Foreign bodies on the cornea are an every day occurrence, and a general practitioner can easily remove them with a little practice. Many patients come to the ophthalmologist with a destruction of the epithelium of the cornea, causing ulcers, leaving maculae of the cornea and permanent scars, and considerably reducing the acuity of vision. This is usually the result of faulty manipulation in attempting to remove foreign bodies from the cornea. The custom of every pharmacist acting as a good samaritan in removing foreign bodies from the cornea is a most dangerous one. A foreign body of the cornea can be easily removed. Find out with a magnifying glass where the foreign body is. Instil a few drops of 3 or 5 per cent. cocaine solution in the eye so that the cornea becomes entirely anesthetized. Have a good light. Sterilize a spud, or if you have no eye spud, you can use a sharp sewing needle which has been sterilized by heating over a flame. If the foreign body consists of steel, iron, or emery, it is most difficult to remove because, besides the foreign body, the brown colored ring that is formed around the corneal tissue must also be scraped off. If there is much infiltration or if an ulcer in the cornea is threatened as a result of the foreign body, a drop or two of 1 per cent. atropine should be instilled. When there is much irritation and photophobia, a bandage should be applied for twelve hours, and then hot applications every two hours for a day or two. Very often a dark pigment of the iris shines through the cornea, and is mistaken for a foreign body by the inexperienced. By oblique illumination such a spot can be easily differentiated from a foreign body.

Strabismus or squint exists when there is a deviation in the direction of the eyes so that visual axes are not directed toward the same object. There are two kinds of strabismus, the concomitant and paralytic. The concomitant can be differentiated in the following way: Request the patient to look at an object or finger held about one meter in front of him, then bring the object nearer to the patient so as to call into action the muscles of accommodation. If one eye fixes the object while the other eye, after following a certain distance, suddenly deviates inward, it is convergent strabismus. If it deviates outward, it is divergent strabismus. When both eyes follow the object or finger to a certain point and one stops after making a few jerking oscillating movements, it is paralytic. It is the duty of the general practitioner to pay attention to the frightened mother when she comes to him and states that her child is cross-eyed. Her fear is well founded, as the cross eye may become entirely blind from non-use. The old adage, "Your child will outgrow it," is not true, as we see too many squinting eyes become blind from non-use. Convergent strabismus is usually due to hypermetropia in about 80 per cent. of cases. Strabismus up to the first year is not of great importance, as binocular vision in babies is not established until between the sixth and the ninth months. After one year squint is abnormal. Up to two years, it is useless to prescribe glasses as children are apt to injure themselves. Up to that time, and in order that the squinting eye may not become amblyopic from non-use, it is customary to use atropine in the well eye from time to time in order to make the squinting eye fix for near objects and the well eye for far objects. The sooner squinting children are referred to the ophthalmologist for treatment, the greater chance there is for saving the cross eye either by correcting the errors of refraction or by operative procedure.

Fundus examination as an aid to the internist.—It is useless to go into details about the importance of the fundus examination in internal diseases. One can only appreciate this in hospitals where every case of Bright's disease, heart lesions, arteriosclerosis, pernicious anemia, leukemia, and numerous other diseases is examined for lesions in the retina. Very often the ophthalmologist, after examining the eye-ground, reports to the physician that the patient is not suffering from nervous indigestion, but from tabes dorsalis, arteriosclerosis, some form of Bright's disease, or a tumor of the brain, and the treatment of the patient is entirely different from what it was prior to such examination. It behooves the medical man to have the eye-ground examined in every patient when there is the least suspicion, as such an examination may help a great deal in the treatment of the case.

Errors of refraction.—That so much refraction should be done by opticians or so-called optometrists who know very little about the anatomic, physiologic and pathologic condition of the eye, is very unfortunate and a waste of money by the public. Competition between the optician and the ophthalmologist has no equal in the annals of medicine. While the ophthalmologist, a graduate in medicine, struggles for a number of years to become an efficient examiner of the errors of refraction, the optician, a layman, gets there in a few months. Opticians usually undercorrect hypermetropia, overcorrect myopia, and do very little for asthenopia. Many physicians tell their patients, "Your headaches are due to your eyes and you require glasses," but they fail to refer them to an ophthalmologist or an eye clinic. Consequently, the patient goes to the nearest department store to get a pair of glasses, and the results are far from satisfactory.

Hundreds of children and adults come to us daily with high myopia and chorioiditis with myopic crescents. They change glasses almost monthly on the advice of opticians, instead of being treated hygienically and directed as to what occupation to pursue. A high myopic must be warned as to occupation. If proper care is not taken, high myopia leads to the detachment of the retina and complete blindness. In many cases of high myopia where there are no retinal lesions, the removal of the lens may give the patient almost normal vision. Many cases of asthenopia should be corrected, not only by prescribing suitable glasses, but also by proper prophylaxis as to change of mode of life or change of scenery. It is, therefore, clear that errors of refraction should not be left to ordinary opticians or optometrists, but to an ophthalmologist who not only knows about the eyes, but is also progressing with the science of medicine. Many patients who come for errors of refraction are found to have lesions in the retina which in all probability is an indication of the pathologic condition going on within the body.

In conclusion, Leavitt says that it would not be amiss to give students a better course in examining the fundi, and every large hospital having an eye dispensary should permit its internes to examine the eyes to get some idea at least of the external diseases of the eye in order that the general practitioner will have no excuse to say, "I know nothing about the eye," as is frequently heard. The time is not far off when the ophthalmoscope will be to the general practitioner what the otoscope is to the pediatrist.

Eye Symptoms Secondary to Focal Infections. J. J. Wynn[4] believes that "team-work" is necessary if we are to get at the root of the trouble, which may be in the teeth, tonsils, intestinal tract, or urinary organs. The eye symptoms may vary from a mere temporary blurring of vision to the most severe inflammation of the iris, ciliary body, optic nerve or glaucoma. Extension of inflammation through the thin walls of the nasal accessory sinuses by continuity especially to the optic nerve where it passes through the foramen. A mere cursory examination of the nose will often fail to reveal sinus disease that is causing the most severe focal symptoms. cated by Dowling of great value. If the sinus is affected Wynn has found the use of argyrol tampons as advo- there will be a free flow of muco-pus, and the tampon

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(4) Jour. Ophth. and Otolaryngol., February, 1917.

will be discolored. It is also a good form of local treatment.

[In spite of the present popularity of "Focal Infection" (from the tonsils, teeth, etc.), the Editor does not believe that the case for this source of disease has yet (so far as concerns the ocular apparatus) been definitely made out. The main difficulty of diagnosis is that there are many *coincidences* as well as a number of *post hoc propter hoc* instances reported in evidence. It is really no argument of value that because a man has an iritis *and* a well-marked pyorrhea that the cure of the latter is followed by the disappearance of the former (especially when the former is treated by atropine, hot applications and *time*) that the one is dependent upon the other.

This statement is not made for the purpose of discouraging investigation or even of denying the alleged relations of dental disease and ocular symptoms, but is written in view of the fact that in the past we have been brought many times to acknowledge *sequiturs* when none existed. Let us, therefore, wait, watch and report the cases in which well-defined foci of infection are present and *not* followed by ocular symptoms as well as those that are, before we connect the one with the other.—Ed.]

Eye Signs and Symptoms of Mongolian Idiocy. Eleven cases of this congenital defect are described by Casey Wood.[5] This form of idiocy and imbecility offers in the majority of cases certain rather definite ocular alterations.

The literature is fairly voluminous for so rare a condition, but probably all that can be said upon the subject will be found in the communications of O. W. Ormond, who has collaborated with others in his report to the *British Medical Journal,* July 23, 1910, and to the *Ophthalmic Review,* December, 1911, on forty-three defectives, all of whom presented various forms of ophthalmic disease.

At the outset it may be said that more than 50 per cent. of Mongolian idiots show eye changes of various sorts, and that these are mainly abnormal direction of

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(5) Ophth. Record, May, 1917.

the interpalpebral fissure, epicanthus, blepharitis, ectropion, squint, nystagmus and cataract.

The relative position or direction of the interpalpebral fissure forms one of the general characters of this mental defect. The fissure on each side is directed upward and outward in nearly two-thirds of the cases, giving a decided "Chinese" appearance to the unfortunate patient.

Epicanthus is a very common congenital anomaly in Mongolian idiocy and is found in about one-quarter of all the cases. W. F. Hardy (*American Encyclopedia of Ophthalmology,* p. 2792, Vol. IV) remarks that "a condition somewhat analogous to epicanthus is normal to the Mongolian race in which the bridge of the nose remains flat. Children with epicanthus have therefore been referred to as Mongolian types and have been thought to represent examples of atavism. The admixture of Mongolian blood has also been suspected. Both of these suppositions can in most cases be positively ruled out. The spontaneous cure, due to the growth of the nasal bridge, certainly speaks against such views."

In three of the writer's cases the epicanthic condition was well marked, and in one instance was associated with a decided bilateral congenital stenosis of the lachrymal duct—the so-called infantile dacryocystitis.

Blepharitis is generally of the dry, marginal type, and is thought by some observers to be due to the uncleanly habits of a certain class of idiots, who frequently rub their eyes. Personally that has not been Wood's impression of its causation and perpetuation. The facial skin as a whole is often not normal and the dermal covering of the lid may exhibit the same characters and serve as a basis for the blepharitis; or it is perpetuated by ectropion and possibly by errors of refraction, that are also frequently present.

The ectropion, just referred to, together with the scaly blepharitis, is found in nearly half the cases of Mongolian idiocy. The former is very likely due to a superficial contraction of the palpebral skin, which is often rough, glazed and quite dry. In one case this condition of the lids was well shown, and gave rise to a good deal of trouble.

Squint, generally of the convergent variety, is quite frequently present and may be regarded as one of the stigmata of Mongolian idiocy. It occurred in three instances, while Ormond noticed it in nine cases out of the forty-three that he reported. There does not seem to be anything special about the form of the strabismus, and it is associated, as a rule, with the usual amount of hypermetropia.

Of *refractive errors* it may be said that an unusual degree of hypermetropia, generally associated with astigmatism, is common in Mongoloids.

Nystagmus, of the lateral variety, occurred in two cases, and Ormond reports five instances in his forty-three cases.

Cataract. By far the most characteristic and most interesting concomitant ocular change in this form of idiocy is, however, lenticular opacities. These occur so regularly that they may be regarded as a veritable stigma of Mongolian idiocy, and when there is doubt as to the form of the mental defect in early infancy, the writer believes the fundus should be carefully scanned for the punctate form of the anomaly, because it occurs in more than half the cases.

One of the peculiarities of this dotted cataract is that it is not easy to discover in infants a few months old. The dots at this period are so translucent that they can not always be seen by transmitted light. Later, they probably increase in number and in opacity, so that their presence can readily be detected. They are always of incomplete form and appear in the lens layers occupied by the changes in ordinary lamellar cataract. They do not spread to the periphery of the lens, but take the form of small, definite, discrete dots. In about one-quarter of the cases there is also well marked posterior polar cataract.

In the eleven cases examined there were no vitreous, retino-chorioidal or optic nerve changes. Wood does not believe that alterations of this character belong to the ocular stigmata of Mongolian idiocy. For this reason and because of the fact that the abnormalities first mentioned are not part of a general luetic or tuberculous infection, the writer ventures the statement that the cause of the psychosis itself is not essentially syphilitic or tubercular, in spite of the fact that the vast majority of these imbeciles die early of tuberculosis.

It may be added that inability to see these congenital conditions has given rise to the statement that Mongolian cataract does not appear until the sixth or seventh year, while the truth is that they are freuqently present in the first months of life, but it is easy to overlook them at that age.

Some authorities have noticed an interstitial keratitis in a few instances, but this, again, is probably an accidental occurrence.

In accord with the general findings, the ocular defects in this disease are not of the familial type; each one of the eleven cases, for instance, formed the only example of marked mental incapacity in the immediate family.

Owing to the extreme difficulties connected with the making of an eye examination of Mongolian idiots, the visual acuity can only be guessed at, and the writer found it almost impossible in every one of the cases to determine, apart from the doubtful aid of the skiascopic mirror and the ophthalmometer, the precise refractive condition. The inability of the child to concentrate is, of course, the main explanation of this difficulty.

Suspected Tumor of the Pituitary Body. Howard Hansell[6] reports on a boy, aged 17, who complained of nearly constant frontal headache and stated that the sight of the left eye was not good and that it had never been as acute as that of the right eye. He has never worn glasses. R. V. = 6/6 partly. L. V. == 6/40 excentrically. On the temporal half of the left field all objects were obscured when not entirely lost. The pupil of the left eye was dilated under all conditions of light one mm. larger than the right. The hemianopsic pupillary reaction could not be positively proved yet the response to a bright, suddenly exposed minute light, was less prompt and less excursive by the nasal half than by the temporal half of the iris. Determination of limits of the left field by means of a small electric lamp brought out a marked contrast in the perception of the

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(6) Ophth. Record, June, 1917.

light and its exact location between the nasal and temporal halves. In the latter the light could be dimly perceived and imperfectly located. In the former it was everywhere distinct and its position accurately designated. The dividing line seemed to be exactly vertical excluding the point of fixation. The right field as measured by the lamp was not limited. A more accurate estimation of the fields by the perimeter showed concentric limitation in the right and a contracted hemianopsic field in the left (Fig. 7-1). In the blind portion of the field of each eye well-illuminated particles were dimly seen.

The patient was entirely deaf in the left ear. The deafness was due, according to his mother's statement, to scarlet fever which he had when five or six years of age. Dr. Keelor, of the ear department of the Jefferson Medical College Hospital, stated that examination of the ear showed external normal conditions. When questioned as to the diagnosis and its bearing on the deafness he replied in writing: "It is definitely shown that this case can not be explained by one lesion because we can not visualize any one portion of the brain that would account for the dilatation of the pupils and destruction of the temporal field of the left eye, at the same time showing a marked degree of internal deafness of the left side."

The test by revolving the patient in a chair, or by douching the ears with hot or cold water or by applying the galvanic current to the ear, so well and practically described by Dr. J. H. Jones (*Jour. Amer. Med. Ass'n.,* March 17, 1917), was applied with only physiologic reactions. Hence there could be no pathologic interference with the connection between the ear and the brain.

A radiograph taken by Dr. W. F. Manges revealed "interference by pressure on one or more of the large blood channels, probably the sinus in closest relation to the base of the brain in the region of the sella turcica or longitudinal sinus about the level of the coronal sutures. Diagnosis: Possibly brain tumor."

The patient was sent to Dr. F. X. Dercum in consultation, who at first believed the symptoms pointed

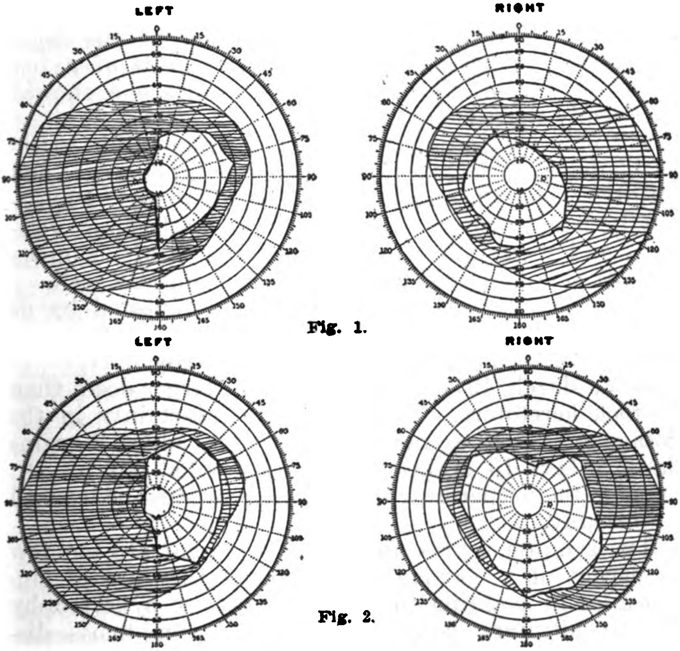

Fig. 1.

Fig. 2.

Fig. 7. Suspected tumor of the pituitary body.

to hysteria, but later was inclined to the opinion that they were due to tumor of the pituitary body. Further examination by Dr. Dercum and Dr. Gilpin in the Dispensary for Nervous Diseases of the Jefferson Hospital strengthened the latter opinion. Under date of March 26, 1917, Dr. Gilpin writes: "The examination of E. W. from the neurologic standpoint shows nothing abnormal. He has no disturbance of gait, station, reflexes, motion or sensation, and he presents no evidence whatever of hysteria. We rather suspect he has some lesion of his pituitary gland but can give no positive evidence to sustain such a diagnosis."

The eye symptoms and the *x*-ray report point to the diagnosis of tumor of the pituitary gland and the neurologic report supports the diagnosis by exclusion. The charts of the visual fields show concentric contraction of the right and complete left hemianopsia. The fovea was not included in the blind portion of the field. Charts of the fields were taken at intervals of a few weeks by Dr. J. S. Fritch, and the last one showed practically the same outlines as the first (Fig. 7-2).

The only medication has been potassium iodide in 10-grain doses, to which he soon showed intolerance, and pituitrin, and thyroid extract in small doses. Physically he has improved. He has now no headache or vomiting and were it not for the partial loss of vision on the left side he would consider himself entirely well.

The glandular extracts, so favorably reported by de Schweinitz in three similar cases (*Penna. Med. Jour.*, April, 1912), and by Elsberg and Krug (*Arch. of Ophth.*, March, 1917), will be given in larger doses than he took heretofore. There is much uncertainty in the dosage of thyroid extracts. Some writers advise 3 grains daily, others 15 grains daily. As pointed out by Dr. Dercum the proper dose for each patient must be learned empirically.

The symptoms presented by this patient are too few to permit of a positive diagnosis, yet they are of significance in pointing to a tumor, cyst, or hypertrophy of the pituitary body. The clinical symptoms—disturbed nutrition, drowsiness, headache, gradual loss of vision through advancing optic nerve atrophy, irritability, weakness, bitemporal or homonymous hemianopsia or other field defects are not to be expected in each case.

The fields, practically unchanged in an interval of three months, show a well-defined left temporal hemianopsia without scotomata. Of the right a moderate concentric contraction also without scotomata. The patient presents no indications of acromegaly. This indicates that the changes in the pituitary body, if any are present, are not the same as those commonly found in acromegaly, namely: adenomatous changes in the gland itself. Hence Hansell and his colleagues are strengthened in their opinion that they are dealing with a tumor of the gland or a part of the gland. Thus far in the history signs of bodily involvement are altogether lacking. The nature of the lesion is at present conjectural. Hemorrhages in the chiasm may be excluded for, while the left monocular temporal blindness was noticed by the patient first in its completeness, the subsequent history, together with the youth of the patient, would tend to exclude pressure by an accumulation of blood. The picture of normal eye-grounds persisting through three months is not inconsistent with the conception of a small tumor, possibly cyst, of the pituitary body which has almost completely destroyed the function of the anterior left part of the chiasm and has invaded, by pressure or inflammation, the right optic nerve.

While cases have been reported in which during the entire course of the disease the eye-grounds remained normal, most observers have noticed a gradual whitening of the nerve heads as the affection advances or from the beginning choked disc or optic neuritis. The ophthalmoscopic findings as well as the character of the field defects depend on the size, position and nature of the tumor in any individual case.

Ocular Symptoms Following Inoculation Against Typhoid. de Lapersonne[7] states that although a certain number of cases of ocular lesions after inoculation have been noted, only a small proportion of the observations are worthy of credence. Among the cases which have been carefully observed it is essential to distinguish between those in which the vaccine may be held responsible, and those in which another and coincident cause exists. In the latter category are to be placed cases of septic infections (staphylococcus, streptococcus, and pneumococcus) following inoculation and due to faulty methods of preparation or administration of the vaccine, or to latent infection in the patient. The writer cites an instance of such infection in a soldier in whom multiple boils, broncho-pneumonia, and metastatic purulent iridocyclitis occurred as a sequel to antityphoid inoculation. Cases of this nature are extremely rare; they should, nevertheless, be made public in order to emphasize the necessity for the strictest attention to asepsis, and a thorough clinical examination of the patient before inoculation.

de Lapersonne holds that in some cases the vaccine,

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(7) Arch. d'Ophthal., April, 1917.

apart from any extraneous source of mischief, may be responsible for ocular lesions, *e. g.*, iridocyclitis. He suggests, as not impossible, that in an eye which had previously been diseased, the severe reaction of antityphoid inoculation may excite a recurrent attack of inflammation, and that this is especially likely to occur in a tissue so richly vascular as the uveal tract.

He summarizes his opinions as follows:

1. Infections resulting from faulty *technique,* often serious in character, are not due to the direct action of the vaccine.
2. Antityphoid vaccine has given rise, directly, to a very small number of ocular lesions, notably to corneal herpes (ascribed to toxic neuritis of the trigeminal), and to iridocyclitis in patients with constitutional taint. Glaucoma, secondary to iridocyclitis, may develop during the reaction which follows vaccination.
3. No instances of definite lesions of the optic nerves or tracts or of oculomotor paralysis have been recorded.
4. Primary acute glaucoma may develop during the vaccination reaction.
5. No lesion should be ascribed to inoculation which does not arise during or very shortly after the series of injections, and while the thermometer affords evidence of a severe reaction.
6. An ophthalmoscopic, in addition to a medical, examination, should be made before inoculation. It is inadvisable to submit to inoculation, syphilitic, tuberculous or arthritic subjects over 40 years of age who have had lesions of the uveal tract.

Phinizy Calhoun[8] has also reported a few cases of *ocular lesions following antityphoid inoculations.* At first it was thought that the association of the two conditions was merely a coincidence, but as additional cases appear, it would seem that there is some real relationship between the inoculations and the ocular disorder.

Case 1. Mr. B., age 35, lawyer, was admitted to the camp May 11, 1917, having passed a rigid physical examination, his vision being 20/20 in each eye. On May 12 he was vaccinated for smallpox, and given the first inoculation for typhoid and paratyphoid. The follow-

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(8) Ophth. Record, November, 1917.

ing day the right eye became a little inflamed, and on May 14 he reported to the post hospital for treatment and was there confined and given treatment for an acute conjunctivitis. As the eye grew worse the writer was called to see him on May 19.

The examination showed a marked injection of the globe which was tender to palpation. The pupil was small and did not react to light. There was posterior synechia and the aqueous was cloudy. The patient had suffered a great deal of pain, and vision was reduced. A typical picture of iritis was recognized. There was no previous history of an ocular disorder. He denied syphilis, but acknowledged an old Neisser infection. A Wassermann was negative, but there was a slight positive reaction to the Neisser complement-fixation test. Teeth and gums appeared normal, as was the nose and throat examination (no *x*-ray). Under the usual treatment of hot fomentations, atropine, dionine and alteratives, the eye completely cleared and he was dismissed June 17 with 20/20 vision (atropine). He did not receive other inoculations and was dismissed from training.

Case 2. Mr. L., age 22, entered the training camp May 11, 1917, after having passed the necessary physical and visual examinations. His vision was below standard in each eye, but brought to 20/20 with minus cylinders. He received the vaccination for smallpox, and the first inoculation for typhoid and paratyphoid on May 14, the second on May 20, and the third on May 27. On June 1 he complained of blurred sight in the left eye of a few days' duration. There had been no pain or redness in the eye. The examination of the left eye showed 20/30 vision, the pupil was smaller than the right, and there was a slight circumcorneal injection. After dilation a few posterior corneal deposits were found, a few vitreous opacities and an area of acute chorioiditis about the size of the disc, situated below the macular region, and another smaller area between the superior vessels about a disc diameter from the nerve head. He denied venereal infections. A Wassermann was positive + + +. No other source of infection could be found. He was given one injection of salvarsan in addition to appropriate doses of mercury and potassium. In due course of time he was rejected and returned to his home for additional treatment.

Ocular Headache. Headache is the most frequent punishment which, as says D. H. Bell,[9] an impartial Mother Nature inflicts upon her erring children and few there are who escape this chastisement.

Leszynsky classifies headache as follows: toxemic, neuropathic, reflex and circulatory. Ocular headache is of a reflex type and forms a very large percentage of the total number. We should remember that a very considerable portion of the brain and cranial nerves are devoted to the requirements of sight. A large area in the frontal region, part of the temporal cortex and occipital and angular lobes, also a part of the cerebellum, are so employed. Four cranial nerves and a part of two others are used exclusively for the function of vision.

Ocular headache is pain in or about the eyes, due to disease or impaired function of the visual apparatus, of which a common example is the supraorbital pain produced by eye strain. According to Weber, of Philadelphia, the ciliary muscle in its effort to secure for its possessor the best possible vision under unfavorable conditions, provokes an irregular discharge of nerve energy along the oculomotor nerve to its nucleus, upon which it depends for its proper government. This irritates the neighboring fifth nerve nucleus with its termination in the forehead. With this ache there goes a deep, dull pain, proceeding from the centers themselves and from the cortex through the sympathetic to the dura mater. Soon the whole front of the head aches and a typical eye-strain picture is produced.

As to site of the headache, Zimmerman, of Philadelphia, kept a series of statistics on 2,000 cases and found 70 per cent. frontal, 16 per cent. fronto-occipital and the remaining 14 per cent. temporal, occipital, vertical, etc. He does not believe muscular error to be a very common source of headache as compared to ametropia.

Ocular headache presents many varieties. Usually more or less paroxysmal, they frequently follow shopping excursions, train or auto traveling, and periods of

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(9) Northwest Medicine, December, 1917.

worry and excitement. Headache due to iritis lies in the eyeball and temple and radiates backward.

Glaucomatous headache is frontal and temporal, accompanied by a feeling of pressure. Some of the most serious diseases of the eye, such as cataract, chorioiditis. retinitis and optic neuritis, as well as simple glaucoma, are usually free from pain and show only by a failing vision.

From ocular headache no age is exempt but it is less common after 45. Those of sedentary habits, of indoor vocations and those working by poor or artificial light are most afflicted. A weak nervous organization, accompanied by poor physical condition, furnishes many sufferers and yet these patients may have little or no optical errors present.

The typical eye headache usually appears in the afternoon, following close work or mental excitement (86 per cent. frontal or fronto-occipital), grows worse towards evening and disappears before morning after a night's sleep. However, a morning headache may be due to the eyes if they have been subjected to much strain by excessive reading or close work on the preceding evening.

Nausea and vomiting are not unusual accompaniments of eye-strain and these symptoms may even precede the headache. Also, like migraine, ocular headache may be more or less periodic in character, depending upon certain irregularities of habits. The conjunctiva may be red or not, but is often unusually pale.

As to differential diagnosis we have to distinguish especially renal disorders, migraine, anemia, indigestion, constipation, nasal sinus disease and neurasthenia. Renal headache often much resembles the ocular type, but it is accompanied by arteriosclerotic changes, is more often of a throbbing character and accompanied by tinnitus and vertigo. The two are so similar, however, that a very careful examination of the urinary and other findings should be considered as well as an ophthalmoscopic examination of the fundus oculi. This last will not infrequently show the beginning of nephritis before it can be detected by other diagnostic methods.

Anemic headache is often associated with occipital pressure and general weakness, and a blood test will differentiate it. Constipation and indigestion headaches are likely to be of a throbbing character and are made worse by sudden movements of the head. Nasal sinus and turbinal affections radiate from the roof of the nose backward toward the occiput, and are intensified by bending and stooping over and are worse in the morning.

Neurasthenic headaches are likely to be worse in the morning, becoming lighter or disappearing during the day; also there is often a band-like feeling about the head. Uterine disease shows a vertical or occipital pain, sharp and radiating.

Migraine has its peculiar symptoms of a frequently preceding aura, of periodicity and, like all vasomotor reflexes, is of a throbbing character. It begins usually at puberty and is most frequent in females, with them disappearing at the menopause. Often hereditary, with different members of the family having other types of neuroses, attacks are precipitated by shock, overwork, disease and also by refractive errors. Usually one-sided, accompanied by nausea and blinding pain lasting six to twenty-four hours as a rule, it is one of the most distressing of bodily ailments and, although attacks may be brought on by refractive errors, it is not likely to be mistaken for ocular headache. If in doubt, a prolonged use of atropine in the eyes is advisable, for the rest to the eyes and to clear up the diagnosis.

About 80 per cent. of ocular headache is said to be due to astigmatism and other forms of ametropia, the remainder to muscle weakness and these conditions are usually inherited, so that so-called hereditary headache means an inherited ametropia and may have never been discovered and corrected in the parents. A very small degree of astigmatism, even one-fourth diopter, having an oblique axis in one or both eyes, may cause much distress. Also the vision is often perfect in hypermetropia, yet the ciliary muscle may be in constant strain. It is in these very cases, where this muscle is able to overcome the error, that it is most overworked. The greatest acuity of vision found in a patient may be accompanied by a marked degree of astigmatism, hypermetropia and muscle imbalance, causing severe headache and even diplopia at times.

In high degrees of error the ciliary muscle quits trying, thus producing in children amblyopia from disuse disease and crossing of one eye, and the strain is thus relaxed. Again, it is possible to have headache from eye-strain without the presence of any error or refraction at all, yet the fluffy retina and hyperemic nerve head, photophobia, etc., show definite strain.

Refraction and well-managed after-care will cure around 90 per cent. of ocular headaches. Usually they are not relieved at once, for many persons have developed a headache habit, and the nutrition of the eye has been disturbed through strain. Again, certain changed relations are established between the convergence and accommodative powers that take time for adjustment, when glasses are worn for the first time. As to muscular imbalance, properly directed exercises will cure or markedly improve many of these cases in a few weeks.

Cross-eyed children are not usually subject to headache, but practically all of these can be cured and the eyes made straight by properly fitted glasses, if begun early enough. This age ranges from 3 to 6 years. Beyond this time the vision is usually hopelessly lost in the squinting eye and the condition incurable except by operation.

Styes, blepharitis and some conjunctival and corneal diseases may be relieved by proper glasses and occasionally insomnia and bed-wetting or other neuroses as well. In migraine about one-third of all cases are relieved through refraction.

Treatment. All ocular headaches should be carefully refracted under a cycloplegic. This relaxes the ciliary muscle and permits a careful retinoscopy which after all is the only reliable method of ocular measurement. No person, who because of refractive errors is required constantly to strain his accommodations, can relax the ciliary muscle at will during the fitting of glasses at the trial case and the result of such refraction is at best only approximate and the relief of most headaches require exact and full correction.

Again a mydriatic is a rest to the ciliary muscle and to the congested retina and chorioid and this acts as a factor in treatment as well as diagnosis, for practically all ocular headaches are absent while under its influence. As to its dangers, it is Bell's custom to use only homatropine after the age of 40 and to follow it with eserine before the patient leaves the office.

Of course the oculist should be able to judge the appearance of an eye predisposed to glaucoma, but preliminary use of homatropine is a safe rule to follow even in iritis in those past 40. The accommodative power at 50 years is usually not over two and one-half diopters, still many have more and only a mydriatic will bring it out.

Beginning presbyopes should be very carefully refracted, not only on account of possible arteriosclerotic diseases, but to avoid the dangers to the eye of strain at that age, and every person, whose near point recedes beyond fourteen inches or lines begin to blur, should begin wearing glasses for close work. As to time of change in the refraction, it is usually necessary to make a change of glasses every two and a half to three years in young or old; and often a small change relieves the renewed eye-strain.

The fact that a child may lay aside glasses after wearing them a while does not prove that they were not needed, but that a vacation or lessened work for the eyes or improvement in general health allowed the ciliary muscles to overcome the ametropia without discomfort, and the glasses bridged over a period of serious danger to the eyes of the child.

Because of the great danger of neglected hypermetropia giving way to a myopia through eye-strain and as myopia is a disease which terminates in blindness if allowed to progress, all children before entering school should be examined by a competent school nurse for acuteness of vision and signs of eye-strain, such as headaches, photophobia, blepharitis, tearing, styes, chronic conjunctivitis, etc., and if so affected should be required to take proper treatment or be refused admission. This examination should be repeated every two or three years during school life.

The writer concludes:

A case of suspected ocular headache should be carefully refracted under a cycloplegic.

All children with crossed-eyes, either with or without headache, should be refracted between the ages of 3 and 6 years.

All children entering school should be examined by a competent nurse for signs of eye-strain and, if found so affected, should be required to have a careful eye examination and proper treatment.

Excellent vision in the presence of other evidences of eye-strain is of no diagnostic value.

Many serious eye diseases are not accompanied by headache but show only by failing vision.

One-third of cases of migraine can be relieved by glasses.

Ninety per cent. of eye headaches can be cured by proper refraction and treatment to the eyes.

The cure of an eye headache often takes time because of poor nutrition of the eye and disturbed relations of convergence and accommodation and also the training of new habits.

All adults should wear glasses as soon as the near point recedes beyond fourteen inches or the lines begin to blur, in order that headaches may be avoided as well as serious injury to the eyes.

Intra-ocular Tuberculosis and Associated Inflammatory Lesions of the Upper Respiratory Tract. That ocular tuberculosis may or may not be associated with nasal tuberculosis or tuberculosis of the accessory sinuses is pointed out by F. O. Schwartz and M. M. Meyers.[1]

Ocular tuberculosis may be associated with staphylococcus, streptococcus, diplococcus, pneumococcus, *B. fetidus, B. perez* syphilitic and other infections of the nose or accessory sinuses.

There may be present both a nasal tuberculosis and one of the other infections simultaneously.

There may be an ocular tuberculosis with a diphtheritic rhinitis in one naris and staphylococcus and

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(1) Jour. Missouri State Med. Ass'n., July, 1917.

pneumococcus rhinitis in the other, with a positive Wassermann.

The nasal symptoms resemble a slight coryza in some cases, and in others are at times wanting.

The nasal reaction is usually present on the side corresponding with the ocular lesion or is most marked on the same side where the lesion is most severe, when both eyes are involved.

The use of tuberculin seems to produce a reaction in the regions of the nose and sinuses in individuals with ocular tuberculosis; but in patients whose nasal and sinus mucous membranes swell and produce a thin mucous or purulent discharge when injected with tuberculin, are we to regard this reaction as one indicating that the nose and sinuses are tuberculous, particularly if the secretions fail to reveal tubercle bacilli?

Would not the injection of any vaccine or bacteria produce the same reaction in mucous membrane surfaces, on the theory that a foreign substance is introduced into the body and gains access into the circulatory system, producing a vascular change, perhaps vasodilatation through a vasomotor effect?

This is a phase of the work that is of relative diagnostic import, but it has its limitations.

The authors believe that nasal tuberculosis and sinus tuberculosis may infrequently be primary and have in mind the theoretical assumption of Adami, namely, the existence of a condition or stage of subinfection or preinfection of cells in certain diseases.

"This fact, coupled with the gratifying results obtained in treating the nose, nasopharynx and sinuses in properly selected cases, brings us to the conclusion that in not only tuberculous disease of the eye, but in all others, the thought of free drainage in the nose and the use of local antiseptics and nasal douches will do much toward assisting an earlier and more satisfactory result. With the isolation of the type of microörganism at fault in the nose and sinuses, the proper bacterial autogenous vaccine must be used."

Ocular Disturbances in Pregnancy. The disturbances of sight and diseases of the ocular structures arising in the course of pregnancy have been studied by Burton Chance.[2] He has pointed out how certain signs are indicative of the gravest danger, either to the life of the woman or they portend the destruction of her sight. Such disturbances, he said, might arise from many causes, but the conditions chiefly considered by him were the affections of the retina, chorioid and optic nerve arising in the course of the toxemia of pregnancy, wherein there is retinochorioiditis accompanied by exudation and hemorrhage. This form of retinitis must not be considered to be albuminuric in the sense that it is dependent upon the same process which produces an acute nephritis. In this connection, it is well to remember that ordinary chronic nephritis might be present before the first pregnancy, and the further fact, that actual renal retinitis may develop during the course of pregnancy. Undoubtedly, the retinitis depends upon disturbances in the kidneys, but the proximate cause of which is the toxemia which brought about the disturbance. The nephritis is not a true acute inflammation, but rather a fatty degeneration of the tubal epithelium which in favorable cases is replaced by healthy cells. In the less favorable a chronic nephritis may ensue with increased rapidity. The epithelium of the kidneys of the pregnant is sensitive to toxins, and it is this sensitiveness, perhaps, which causes the albuminuria while more pronounced disturbances might cause severe nephritis.

The ophthalmoscopic signs may not differ from those observed accompanying other forms of nephritis. In general terms there is a widespread neuroretinitis with exudation and hemorrhage. The retinitis is toxic rather than vascular in origin, although endarteritis has been found. In the vast majority of cases, however, the findings are such as to allow us to suppose that the changes throughout the system are of a temporary nature. Few eclamptic cases show evidences of retinitis and the star figures are rarely found.

Acidosis from imperfect hepatic action is commonly associated with the toxemia. Its exact relation is not definitely established, although it is a well-known clin-

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(2) Ophth. Record, July, 1917.

ical fact that when acidosis is corrected the general symptoms are relieved.

The onset of the symptoms is relatively prolonged; the disturbances of sight may vary from absolute blindness to temporary obscurations direct and peripheral. The prognosis in pregnancy is usually better than in the non-pregnant state, but it depends upon the location of the lesion and whether or not pregnancy can be terminated.

In general it may be said that retinal hemorrhages usually indicate a grave toxemia. If the hemorrhages are over the macula, and if the optic nerve is involved, while the symptoms are not heeded, during which time the toxemia becomes increased, a permanent impairment of vision is inevitable.

The prognosis as regards sight in these cases is probably not so good as is commonly thought, though as regards life it is much better than in the nephritis of the non-pregnant. Sight, however, never improves until the pregnancy is terminated. The ophthalmoscopic examination when positive enables one to make an early diagnosis of the underlying condition, which is sometimes by other methods difficult or impossible. Patients who go on to term show the largest proportion of deaths and the greatest damage to sight. Spontaneous premature delivery shows 11 per cent. of deaths, while after artificial delivery the mortality is but 4 per cent.

In conclusion the writer makes a plea for the early examination of the eyes of all pregnant women, with the assurance that such attention should help to reduce the mortalities among them and prevent the development of disease in so vital an organ as the eye.

Ocular Complications of Measles. As approximately 75 per cent. of those afflicted with measles complain of ocular symptoms, the subject is one of popular interest.

As pointed out by C. A. Bahn,(3) measles is often accompanied by an acute catarrhal conjunctivitis. The temperature rises to 103° F. by the fourth day, when the papular eruption appears upon the face and chest with the pathognomonic Koplik spots. These symptoms usually subside about the eighth day.

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(3) New Orleans Med. and Surg. Reporter, May, 1917.

The most common ocular complication is acute catarrhal conjunctivitis, which ranges from a slight injection and lacrimation to intense redness, thickness, and opacity, with profuse muco-purulent discharge. Bahn believes this is the same process seen in the respiratory tract, and depends upon the virulence of the measles contagium plus secondary infection by the ordinary pyogenic bacteria; of which *Staphylococcus pyogenes, Streptococcus,* Koch-Weeks bacillus, Morax-Axenfeld, etc., have been isolated. With or without treatment, the conjunctival catarrh usually subsides about the tenth day. The treatment includes specific medication, cleanliness, and relief of pain, photophobia, and blepharospasm. The nearest approach to specific medication is: zinc solution, 0.5 per cent., in Morax; optochin, in pneumococcus infection; and calomel powder dusted into the eyes daily, in the other forms. The writer is convinced that the organic silver solutions are of no benefit in acute catarrhal conjunctivitis, and actually do harm by giving the public a sense of false security as (their dark color and staining qualities carry to the lay mind a bactericidal impression). Their use, months or years after being dispensed, and by patient, family, and friends, for any and all ocular affections, and their indelible staining of the conjunctiva and cornea after prolonged use, make them positively harmful.

The following cleansing washes may be used: chloretone, ½ gr.; boracic acid, 10 grs.; camphor water and water, each 4 drams; for the camphor water, cherry laurel water may be substituted. They have no healing effect, but they are pleasant to use, and give the patient something to do. After three minutes' instillation, it has been proven that eye solutions in uninflamed eyes are but 1/20 of their original strength. In inflamed eyes, this would be nearer 1/100. They wash out the antibodies which check infection, and substitute a borax or boric acid solution which is so bactericidal that it becomes cloudy with fungus when exposed to the air over a week. Vaseline with or without any of the mild mercurial preparations prevents the lids from adhering, does not destroy the antibodies, lubricates the eye, and may or may not have any direct bactericidal effect. Dark glasses, prophylaxis, and eye rest should be advised.

Next in frequency is phlyctenular conjunctivitis or keratitis. The typical phlyctenule, often multiple, is a 1 or 2 mm. round, gray elevation near the limbus surrounded by a leash of blood-vessels. It undergoes mechanical erosion, leaving a superficial crater-like ulcer, which may or may not become secondarily infected. It usually heals in ten days, but may last weeks or months, involving the deeper parts or even perforating the cornea. Phlyctenular disease is seen especially in the young, and is common after any of the exanthemata. The treatment is practically the same as for acute conjunctivitis with the addition of 1 per cent. atropine, if necessary, to allay the photophobia by ciliary rest, or eserine, 0.5 per cent. solution, in impending peripheral corneal perforation to draw away the iris. Many cases of phlyctenular disease show tuberculous lesions.

The ulcerative form of blepharitis marginalis is frequently seen after measles. This, like the preceding, is closely associated with eczema. The lid margins are thickened, injected, ulcerated, varying with the character and severity of the secondary infection. The local treatment resolves itself into the cleansing of the lids by alkaline washes, such as sodium bicarbonate, 2 per cent., or castile soap water, and the application of dusting powders, such as calomel, zinc oxide, aristol, etc., which increase scab formation, or protection by vaseline, with or without 2 per cent. yellow oxide of mercury, etc.

Chalazia, the small nodules, so often seen in the upper or lower lids, often follow the exanthemata. They are essentially a pyogenic infection plus retention cyst of the meibomian ducts, and usually rupture with quick healing. Hot applications followed by vigorous massage, with plain vaseline of yellow oxide, 1 to 2 per cent., doubtless hasten their course. Incision and curetage may be employed, if necessary.

Among the rarer ocular complications of measles, the following are reported: Albuminuric neuroretinitis (Parsons); edema of the lids without or with exanthematous spots (von Michel); gangrene of the lids (Hirchberg); ulcer of cornea and loss of eye (Schmidt-Rimpler); phlyctenular ophthalmia (Herchel); corneal ulcers (Bezold, Fischer, Beyer, Trantas); iritis, metastatic ophthalmic, pseudo-glioma (Sturm, Treacher, Collins); myopia, due to posterior scleritis (Jacobson, Muller); albuminuric retinitis and a retinitis similar, but without albuminuria (Satow); optic neuritis, usually bilateral and occurring on and after the third week of the disease; optic atrophy and restoration of vision; amaurosis, without ophthalmic microscopical anomalies, probably uremic in origin (Negal); acute dacryoadenitis (Lindner); periostitis (Struber); bi-lateral orbital cellulitis (Gallemarts); clearing of trachomatous panus or necrosis of leucoma adherens (Hirchberg).

Symptoms of eye-strain and strabismus are often dated from measles. In practically all cases the measles is simply an exciting factor, as would be any other constitutional disorder, trauma, or excessive use of the eyes, engrafted on a congenital predisposing cause.

To conclude, eliminating the acute catarrhal conjunctivitis and measles eruption seen in the conjunctiva, the ocular complications are not specific and occur in any of the exanthemata. Measles, being the most frequent, present more cases of ocular complications.

Corneal Ulcer Produced by Varicella. An example of this rare complication is reported by Jesse S. Wyler.[4] March 10, 1916, he was called to see a girl, aged 5 years, who had been confined to the house for four days with a rather mild case of varicella. The child was well nourished, and the hygienic surroundings were all that could be desired. The mother related that on the second day of the eruption the child became unable to open the right eye, and tears from this eye constantly flowed over the cheek.

The child had a few scattered crusts over the face and chest, no abnormal temperature, and felt well excepting for the eye, which was kept closed. The upper

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(4) Jour. Amer. Med. Ass'n., May 19, 1917.

lid was slightly swollen and the tarsal and bulbar conjunctiva faintly reddened with a ciliary congestion at the limbus. In the center of the cornea was a punched out area perfectly round, which measured about 2 mm. in diameter. The edges were sharply marked and the base of the ulcer was deep and grayish. Staining with methylene blue and fluorescein gave a beautiful demonstration of a blue center with a greenish border. The iris was faintly greenish but reacted slowly. The rest of the cornea was clear. Atropine, 1 per cent., powdered dionine and yellow mercuric oxide, 5 per cent., were used and a bandage applied daily. The ulcer showed no tendency to spread, slowly healed, and in about two weeks was completely covered with epithelium, with a remaining facet which gradually filled out to the level of the cornea. Applications of fibrolysin, and strong ointment of yellow mercuric oxide up to 20 per cent. were used to clear up the opacity and, September 7, the vision of the right eye, which, before the attack, had been normal, was 6/36. The macula is thinning slightly. Wyler believes that this ulcer was the eruption of a pock on the cornea, for: (1) it appeared simultaneously with the skin lesions; (2) it was too large for an ordinary phlyctena and there were no other signs of eczematous conditions generally or locally; (3) the healing was much slower than in ordinary keratitis.

Only one other corneal involvement following chickenpox has been described. The case, reported by Terson, is strikingly similar to this. The patient was a girl aged 18, who had a benign attack of varicella. On the second day a corneal lesion appeared, which persisted. Several days later examination showed a grayish ulceration exactly in the center of the cornea without hypopyon or iritis. It was the size of a pea and quite round. Healing was rapid under xeroform ointment. The round form of the ulcer and absence of all other causes made Terson ascribe the condition to a ruptured vesicle due to varicella. He also makes mention of a second case of chickenpox with optic neuritis as a complication, and quotes the patient of Fuchs who had cyclitis.

Jan. 10, 1917, the vision of the affected eye of the patient was 6/24.

INJURIES OF THE EYE.

The Spontaneous Explosion of Artificial Eyes. A patient wearing a Snellen artificial eye reported to Roy B. Metz[5] that a few hours before, as he was crossing a vacant lot, he had been shot, the bullet striking his artificial eye. Although he could see no one about, yet he had heard the sharp report of a gun, and had felt the impact of the bullet on this eye. Inspection of the eye and of the lids revealed no injury to either. An attempt was then made to remove the eye from the orbit, and a little difficulty was experienced. Usually an artificial eye can be removed very easily, but for a reason not apparent, this eye resisted removal. Finally the attempt at removal succeeded, and it was observed that a slight hemorrhage was occurring from that portion of the conjunctiva which had been in contact with the central portion of the posterior wall of the eye. Inspection of this portion of the eye revealed an irregular round opening of about 5 mm. in diameter. A search of the conjunctival sac did not result in the finding of the missing portion of the eye. However, when an examination of the interior of the eye was made, it was discovered that there were a number of small fragments of glass within, and when these were removed it was easily demonstrated that they together comprised the missing portion of the posterior wall of the eye. Quite apparently when the wall of the eye ruptured the fragments were forced into its cavity and the conjunctiva was drawn into the eye by virtue of a vacuum which existed inside the glass globe. Retention of the conjunctiva in this hole in the eye explained the difficulty which had been experienced in removing the ball from the conjunctival sac, and also explained the slight injury to this portion of the conjunctiva.

At the time of this patient's visit the cause for the breaking of his eye was not clear. It could not be assumed that the eye had actually been struck by a bullet, and that without doing any damage whatever to the anterior portion a gunshot should have occasioned so peculiar a fracture of the posterior wall. It was

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(5) Cleveland Med. Jour., November, 1917.

later that the possibility of an explosion of the glass eye was considered.

Since the occurrence of the case just described, A. S. Rochester has reported a similar case, his patient having experienced the explosion of two different artificial eyes within a short space of time. This author was able to collect among ophthalmologists the reports of eighteen such accidents. At a later date W. B. Weidler reported the explosion of the glass eye of one of his patients.

There is much similarity in the history given by patients experiencing the explosion of an artificial eye. There is a sudden sharp report as though a pistol had been fired in close proximity to the head and at the same time a sharp pain is experienced in the affected orbit. At the time of the accident it was the impression of many of these patients that they had been shot in the eye, and the occurrence of some degree of hemorrhage from the orbit confirmed this belief. Some of the patients fainted from fright.

The damage to the tissues of the orbit from these exploding eyes is usually slight and only exceptionally have deep lacerations occurred. Usually a number of pieces of the glass are imbedded in the soft tissues and require removal.

The Snellen "Reform" eye consists of a globe of glass, this pattern having replaced the older solid-glass shell. In the manufacture of the Snellen improved type the back of the eye is sealed while the whole ball is at a white heat, resulting in the formation of a rather high vacuum in the interior of the globe when cooling has taken place. A sudden change in the temperature of a portion of the eye setting up unequal expansion or contraction may cause it to explode. The globe is built up of many different grades and colors of glass, and the walls vary greatly in thickness, so that proper annealing is very difficult of accomplishment. It was estimated by one manufacturer of these eyes that 0.1 per cent. of them explode while lying packed away.

The observation was made that eyes in stock exploded more commonly during either very hot or very cold weather. In the series of cases collected by Rochester one-half of the explosions are said to have occurred on hot days. The eyes are corroded by the secretions from the conjunctiva of the wearers. Some persons are able to wear an eye for a couple of years before it becomes roughened, while much corrosion may occur in six months in other cases. Of eighteen explosions, four patients experienced it twice, this suggesting that such accidents may be of greater frequency in orbits the secretions from which exert a rapidly deleterious effect upon the glass.

Six Cases of Eye Injury Which Required Enucleation. Six cases of penetrating wounds of the globe by particles of steel which were embedded in the tissues near the posterior pole thus rendering the use of the magnet negative are reported by Leroy Thompson.[6] The cases were all very much alike in that radiography showed plainly the presence of a foreign body in the back of the eye. The magnet tip was introduced through a scleral incision but would not hold the foreign body with sufficient power to remove it, except in his last case. In this case the first use of the magnet failed, but afterward he found he could see two foreign bodies with the electric ophthalmoscope lying in the retina, so he opened into the sclera again and directed the guidance of the magnet tip to the foreign body with the use of the electric ophthalmoscope. Both these foreign bodies were seen to jump to the magnet and were removed. The view was obscured by blood, later, however, a radiograph showed the presence of a foreign body in the same situation and when the eye was removed it was found. All six eyes had to be enucleated because of local or sympathetic disturbance.

Laceration of the Eyeball; Eyelash Driven Into the Lens. A most unusual form of this accident is reported by James R. Smith.[7] F. L., carpenter, had a lacerating wound of the cornea of the left eye. He had been struck in the eye, while sawing, with a splinter of wood. The foreign body penetrated the lens, causing it to become cataractous. There was also a cut of the iris with an anterior synechia. Forty-eight hours after the accident the lens began to swell, and the pupil failed to dilate with atropine, so an operation (iridectomy and cataract

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(6) Jour. Ophth. and Otolaryngol., March, 1917.
(7) Ophth. Record, December, 1917.

extraction) was performed. When the lens was removed an eyelash was found in its center. The hair could be moved to and fro in a tunnel-like opening. The eyelash had evidently been carried into the eye by the splinter of wood.

Steel in the Eye Without Symptoms. M. M. consulted Frank Allport[8] April 2, 1917. He stated that April 1, while adjusting an electrical apparatus, an electrical flash occurred near his face. So far as he knew no foreign body entered his eye. Both eyes were somewhat inflamed. He says this was the first eye accident he ever had. The vision of both eyes was 20/30. The writer found no corneal abrasion by the fluorescein test. There was no opacity of the cornea, no opacity of the lens. He merely came on account of the congestion of both eyes, to get some eye water, as he expressed it. Upon examining the left eye at the extreme lower angle of the anterior chamber a glistening foreign body was noticed. An *x*-ray corroborated this observation. He was sent to the hospital and an incision made at the extreme lower portion of the cornea. The magnet drew the foreign body toward it, but the steel and the iris were held together by sharp points upon the foreign body. Forceps grasped the iris and pulled it out through the corneal opening where it was cut off, making a small iridectomy. The foreign body was delivered at the same time. The magnet promptly drew the steel to its point, thus proving its character. This man made an uneventful recovery with unimpaired vision in ten days.

W. B., who runs a lathe, consulted Allport May 2, 1917. He said that about April 15 he thought a small foreign body struck him in the eye. He went to see a doctor, who examined him carefully and found nothing. He went back to work and had no further trouble. May 2 he noticed that the vision was poor in his right eye.

The eye was entirely uninflamed. An examination disclosed a slight corneal opacity directly over the pupil. He also had a cataract, and in the center of the cataract a glistening piece of steel could be seen. An *x*-ray corroborated this opinion. The writer sent him to the hospital and removed the steel (through a keratome inci-

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(8) Ophth. Record, September, 1917.

sion) with a magnet. He subsequently removed the cataract and secured good results.

The last patient doubtless had a foreign body driven into the lens through the cornea at the time of his accident about April 15, but it is strange that no irritation or pain followed the event, that he should keep on with his work and that he was unconscious of anything being wrong with him until he noticed an impairment of vision May 1. The first case is even more peculiar because the only accident that this man knew anything about was the electric flash, which occurred the day he consulted the writer. At this time, with the exception of a slight redness of both eyes, there was no evidence of any injury at all. There was no wound of the cornea and no opacity of the cornea, yet there was a foreign body in the anterior chamber. Aside from this accident, this man says he never had any previous accident to his eye.

Diagnosis of Iron Fragments in the Iris. The two cases reported by J. van der Hoeve[9] emphasize the importance of removing minute scraps of iron from the eye, although they may seem to be perfectly tolerated at first. In one case, after transient ulceration of the cornea, vision seemed to be normal for seven years, but then severe pain developed in that eye and a brown tumor was found on the iris, about 4 mm. in diameter. It was assumed to be a melanosarcoma and its excision was planned. Just before the operation, however, it was noticed that the supposed tumor had become detached from the iris and changed its position. It was removed and proved to be a scrap of steel in the midst of an amorphous mass. Only traces of the lens were found, but vision was left 3/4. Vision was still more reduced in the second case; in both cases the direct siderosis was unusually pronounced and the eye and vision suffered.

The Haab and Small Magnets in the Extraction of Intra-Ocular Foreign Bodies. M. H. Whiting and C. Goulden[1] have had unusual opportunities of studying cases of this sort. The methods used are, in the main, an elaboration of those used at Moorfields.

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(9) Nedrl. Tijdschr. v. Geneesk., November, 1917.
(1) Brit. Jour. Ophth., January, 1917.

In regard to the general principles of method adopted, they say: "The wound of entry made by the foreign body, be it corneal or scleral, is disregarded from the point of view of extraction, unless there be a large unhealed wound in the cornea or sclera. Such a wound indicates the presence of a large foreign body in the vitreous, which it would be hazardous to remove by any other path. In any case, these eyes are so severely damaged that there is but little chance of saving them. The method we adopt is to draw the foreign body through the suspensory ligament of the lens into the posterior chamber, and then through a suitable corneal incision, by means of the small magnet. The alternative to this general method is to remove the foreign body, after localization by x-rays, through the original scleral wound, or an enlargement of it, or through a suitably placed puncture in the sclera. In France, where a considerable number of the foreign bodies are non-magnetic, this would entail in many cases an unnecessary opening in the eye."

In a paper published by one of the writers it was shown that the *after-results in civil cases treated by this method were not so good as those in which the foreign body was removed via the pupil and anterior chamber.* The assistance given by an x-ray localization is by no means essential to successful treatment; if the localization is likely to involve more than two or three hours' delay, it should be omitted.

The apparatus employed consists of the most recent type, however, actuated by pedal, but without rheostat; the chinrest was removed, since it hampered the movement of the patient's head. Only the medium sharp-pointed short terminal was used, since this gave a maximum of power with a minimum obstruction to view. Variation of power, when required, was obtained by advancing or withdrawing the eye from the point of the magnet. The small magnet was supplied by Weiss, weighing about half a pound, worked from a 4 cell accumulator, with a terminal of soft iron, one inch long, oval in section and tapered like a screwdriver.

In discussing the operation upon patients lying down, the authors emphasize the contention that at the moment the full strength of the current is employed the magnet point should actually touch the cornea slightly above its center, as much power is lost if there is even a few millimeters space between cornea and magnet point. The full current is suddenly applied to disengage the foreign body from its bed (if it lies on the retina) and make it pass forward through the vitreous to the posterior surface of the lens as nearly as possible in the horizontal plane. The ideal result is when the foreign body advances through the vitreous to the posterior surface of the lens and slipping around the edge of the lens, appears free in the anterior chamber. The dangers incurred if the force be gradually applied are that the foreign body may be dragged along the retina, forced into the ciliary body, or become entangled in the root of the iris. They emphasize the importance of noticing the exact moment and position bulging of the iris occurs when pressed upon by the foreign body; the moment, because the current must be cut off at once to avoid entangling the iris, and the position, as this determines the subsequent maneuvers.

Some of the difficulties are:

1. Delay in the passage of the foreign body through the vitreous, most common when the foreign body has been in the eye two or more days and is fixed by exudate; if the dragging sensation which the patient almost always experiences from the time the magnet is first applied if a magnetic foreign body is present, is once produced, efforts to bring the foreign body forward must be continued for some time and it is in these cases that the application of the force of the magnet in a series of jerks proves most useful; in obstinate cases they sometimes apply the magnet to various points on the sclera, thus exerting greater force by placing the point closer to the foreign body, and, by pulling in various directions, loosening it.

2. Entanglement of the foreign body in the iris, shown by movement of the affected part of the iris towards the magnet-point; such cases require great care in manipulation to disentangle and bring the foreign body into the anterior chamber; it is improper to try to pull it through the iris, since this will only impact

it in the tissue. Advice is given as to how to maneuver in these cases with appropriate change in the relative positions of eye and magnet.

3. The presence of a small corneal or corneo-scleral wound with prolapse of iris, when no attempt should be made at removal through such a wound, or through any enlargement, but should be brought to rest as near the lower angle of the anterior chamber as possible.

4. The presence of a very large corneal wound, indicating usually a large intra-ocular foreign body and a poor chance of saving the eye; here the Haab magnet must be used cautiously with the eye at some distance and at the first sign of the foreign body presenting behind the cornea the small magnet should be used and the foreign body extracted through the corneal wound.

5. The presence of an unhealed scleral wound; if the wound be large, the foreign body should be removed through it; if small, by way of the anterior chamber as if no scleral wound existed.

As regards the technique of the use of the small magnet in the removal of the foreign body from the anterior chamber, the writers believe a general anesthetic should be employed in this step as a rule, since the eyes are usually red and tender.

When a prolapse of the iris exists the advice is given never to perform an iridectomy first, but only after the foreign body has been removed. If a traumatic cataract is present and the foreign body can be seen in the lens and no signs of infection exist, the extraction should be deferred until the cataract is also ready for removal; if, however, the lens is broken up, the foreign body should be removed by the usual method and then the soft lens matter washed out.

In speaking of the complications due to infection of the eye, the writers mention the difficulties in removing a foreign body when vitreous bands prevent it from coming forward freely and advise the placing of the point into the anterior chamber as near as possible to the spot where the foreign body presented, after which by gentle traction and lateral movements the foreign body may be freed. Exudates in the anterior chamber should be removed with iris forceps in case they do not come out with the foreign body. Hypopyon, if present, should be removed by free irrigation of anterior chamber with normal saline solution.

Luxation and Avulsion of the Eyeball During Birth. In 1905 Bruno Wolff published a monograph on the "Injuries of the Eyes of Infants During Birth" (*Beiträge zur Augenheilkunde,* Hirschberg Festschrift, 1905, p. 311). These cover a wide range from such slight injuries as produce retinal hemorrhages, to such severe ones as complete separation of the eyeball from the orbit. The classification of injuries is made according to whether birth was spontaneous or instrumental and according to the presentation. Among the cases he has collected there are some of luxation, and some of evulsion of the eyeball. In luxation the eyeball has been forced through the palpebral fissure and lies in front of the eyelids. In evulsion the eyeball is torn out of the orbit. Birch-Hirschfeld reduces Wolff's cases under these headings to fifteen.

Harry Friedenwald[2] describes a case from his own practice. On August 25, 1913, he was called to see a female infant which had been born one and a quarter hours before. The attending physician stated that the fetal head had been in occipito-anterior position, that labor had been very difficult with a rigid os, and that after a long wait he had been obliged to apply high forceps. At birth, he noted that the left eye was exposed, and he feared that there was congenital absence of the eyelids.

On examination, the writer found a deep impression made by the forceps over the left frontal region and reaching down to the orbit. The left eyeball was completely luxated, but appeared otherwise normal; the eyelids were closed behind the eye.

Efforts to reduce the eyeball by gentle pressure and by means of a lid elevator were wholly unsuccessful; the palpebral fissure was too small. An incision was therefor made at the outer canthus and then reduction was easy. Sutures were placed to close the incision, but the eye was not otherwise dressed. The sutures were

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(2) Amer. Jour. Ophth., January, 1918.

removed in a few days. On Sept. 29 the eye appeared normal.

On November 8, 1915, the child was examined carefully, when it was a little over two years of age. The eyeball appeared quite normal. The eye-grounds were healthy, there was no evidence of atrophy of the nerve or of lesion to the retina. The ocular movements were perfect and such tests as could be made indicated that the sight was good.

The favorable outcome of this case makes it quite exceptional, and is in part due to the early reposition of the eyeball, within two hours of delivery—and before there was desiccation and clouding of the cornea.

The marks of the forceps in this case made it evident that the luxation was produced as suggested by Beaumont, just as it is brought about by the speculum during enucleation.

The frequency of luxation and evulsion during birth is difficult to determine with accuracy. The accident is undoubtedly rare in spontaneous delivery. Birch-Hirschfeld (Graefe-Saemisch Handbuch, 2nd Ed., v. 9) points out, however, that while more frequent in instrumental delivery, the most severe cases have occurred when no forceps were used. In several of these cases, however, the injury was due to the finger of the examiner, who mistook the orbit for the rectum.

In a number of cases the infants die from the severity of the head injury. In some cases the eyeball, after reposition, was destroyed by panophthalmitis. There are few cases in which the eye was saved, and in these there were corneal opacities. The case reported by the writer is an exception to this rule.

The subject is also comprehensively dealt with by Wagenmann in the chapter on injuries of the eyeball (*Graefe-Saemisch,* 2nd Ed., v. 9). It is advised that, when reposition of the eyeball is considered, any fragments of bone due to fracture of the orbit be first removed. If necessary the Kroenlein operation should be performed to remove them or collections of blood which interfere with reposition. He also emphasizes the necessity of canthotomy.

MILITARY SURGERY OF THE EYE.

Nature of War Injuries to Eye. From his experiences in the Italian theater of the war, Giuseppe[3] finds that 16 per cent. of injuries of the eyes are from machine guns or shrapnel, 50 per cent. from flying scraps of stone, 5 per cent. from trachoma, and 25 per cent. from asphyxiating gases. The toxic gases which induce much lachrymation are far less dangerous to the eyes than the usual asphyxiating gases. When the latter act on the eye long enough they deprive the cornea of sensibility and if the injury is severe, small foci of necrosis develop, there is severe pain in the brow, back of the neck and temples, and the eye slowly dies, the eyeball becoming completely atrophied.

Syndrome of Claude Bernard-Horner. Burger[4] points out that this syndrome is rarely encountered in military surgery because the injury able to produce it usually proves fatal from hemorrhage. It should, however, be borne in mind when dealing with injuries in the neck. He describes a case which came under his observation. The injury in this case was caused by a fragment of glass. The wound extended on the left side from the angle of the jaw to the mastoid and had detached the sternomastoid muscle from its superior insertion. The bifurcation of the carotid was exposed in the lower part of the wound, and it was necessary to tie branches of the thyrolinguo-facial vein, of the thyroid, lingual, facial and occipital arteries, and also of the external jugular. The hypoglossal nerve was exposed and its descending branch partly divided. Neither the pneumogastric nor the sympathetic nerve was seen. On the following morning the Claude Bernard-Horner syndrome was well established: slight ptosis, enophthalmos, miosis with preservation of pupillary reflexes. The intra-ocular pressure was equal in the two eyes. Lachrymal secretion was excessive. Visual acuity was unaffected, but there was diplopia on looking up and to the right; no apparent strabismus. Three weeks later a full examination of the nervous system was made.

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(3) Ophth. Record, December, 1917.
(4) Arch. Méd. belges, April, 1918.

The left eye then showed slight ptosis, enophthalmos, and miosis with preservation of reflexes. Lachrymal hypersecretion and diplopia had disappeared. There were no vasomotor or sweat disturbances. Accommodation and convergence were normal. Instillations of adrenalin followed by cocaine produced no effect on the pupil even after several hours. On the following day cocaine was first used and adrenalin later. This had the effect of slowly dilating the pupil, but only to a moderate extent. In addition to the ocular symptoms there was paralysis of the left vocal cord, sternomastoid and trapezius and some of the facial muscles.

In the body of the paper Burger gives a brief account of the current views of the anatomy and physiology of the sympathetic in the neck. He explains the transient diplopia from which his patient suffered as due to the altered mechanical conditions under which the extrinsic ocular muscles had to work, owing to the enophthalmos caused by paralysis of smooth muscle fiber in the orbit. A diagram is given to explain this hypothesis.

He sums up as follows: "The cervical sympathetic tract as it leaves the spine is composed of two series of neurones. The first, part of the medullary center (cilio-spinal center of Budge), reaches the superior cervical ganglion by the three or even seven first pairs of dorsal nerves, by their rami communicantes and the cervico-thoracic sympathetic cord. The second series leaves the superior cervical ganglion to reach the eye.

"The syndrome of paralysis of that sympathetic tract is composed of: (1) motor phenomena, ptosis, enophthalmos, miosis with preservation of reflexes; (2) vasomotor and sweat phenomena. Finally, hypotony of the globe and occasionally facial hemiatrophy. This syndrome is nearly always dissociated. We believe that this can only be produced as a result of a partial lesion of the fibers. At the level of the cord where all the fibers are united a dissociation can only take place as a result of a slight lesion, and possibly of the particular susceptibility of certain elements.

"The action of cocaine and adrenalin is of great importance in characterizing the iris disturbances that are seen in sympathetic lesions, and possibly also in the determination of which of the two neurones is affected. Experiments on animals seem to prove that adrenalin shows whether the lesion is above or below the ganglion."

Ocular Manifestations of Icterohemorrhagic Spirochetosis. L. Weekers and J. Firkst[5] report the frequent occurrence of this disease in the field, especially in the trenches. This has led to a serious study of it. It appeared in the Belgian army in August, 1916, and the first cases in the French army were described by Martin and Petit in October, 1916. It invaded the armies on both sides in an almost epidemic form. Although the general symptomalogy has been described in numerous publications the eye manifestations have received but passing notice. As few oculists and civilian physicians have had an opportunity of getting acquainted with this disease the authors give a short sketch of its prominent characteristics.

The disease does not always present the same picture; on the contrary, it is polymorphic, varying greatly especially as to severity. Certain symptoms, however, are always present, which allow a positive diagnosis. The usual clinical picture is this: the patient, while in full health, is surprised by chills, headache, pains in the body, pains in the muscles, especially those of the neck, lumbar region, flanks, posterior aspect of the thighs, and legs. Sometimes there is hyperesthesia of the skin, and the eyes pain when they are moved. The temperature rises rapidly to 102° or 104° F., where it remains for five or six days. During the first period there is great depression, the pulse is small and weak, but not greatly accelerated; the blood-pressure is lowered. Nasal and labial herpes, frequent epistaxis, moderate bronchitis with bloody sputum, a dry, dirty tongue; repeated vomiting of bile. Diarrhea is rare, the stools being, as a rule, formed and colored with bile. Liver and spleen show but little swelling. Traces of albumin and large quantities of urobilin are constantly found in the urine, cylindrical casts are exceptional. About the fourth or fifth day the icterus appears, sometimes light in color, sometimes deepening into a dark yellow or saffron. Soon

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(5) Arch. d'Ophthal., vol. 35, No. 11, p. 647; abstract in Amer. Jour. Ophth., January, 1918.

after the appearance of the icterus the temperature drops to near normal, and the patient improves in every way, except that the urine still retains the abnormal constituents and besides shows bilary pigment.

After five or six days of apyrexia the temperature again rises, and describes a regular curve with wide daily oscillations during a period of six or seven days. This recurrence of fever is better borne than the first period, and during its course the icterus disappears. A long convalescence follows, five to six weeks passing before the blood returns to normal. Cardiac collapse is always to be feared. The mortality ranges from 4 to 8 per cent.

Towards the end of 1914 the causal organism was first described by Japanese authors (Inadu, Ido, *et al.*).[6] It is a spirochete morphologically related to the spirocheta of syphilis, and was first found in coal miners. This discovery threw much light on the etiology of the disease, which had been known clinically for many years under different names: *"ictère fébrile à rechute de Mathieu"; "typhus hépatique de Landouzy"*; "Weil's disease," etc. In those cases in which the icterus does not occur the diagnosis can be made by inoculating guinea-pigs with the blood of the patient during the first seven days of fever, or by examining the sediment of the centrifuged urine passed after the tenth day, when the spirochetae will be found. The fifteenth to twentieth day the spirochetae will be numerous.

In fifty cases of spirochetosis icterohemorrhagica the authors found:

No ocular manifestations	4 cases
Simple hyperemia of the anterior segment of the eye	29 cases
Congestion of the iris	7 cases
Iritis	6 cases
Iritis and optic neuritis	2 cases
Iritis and retrobulbar neuritis	1 case
Ocular herpes	1 case

The hyperemia is an early symptom, and varies much in intensity. Except in the severe cases, in which there is tearing and photophobia, the patients are not much annoyed by the eye condition. Both ciliary and conjunctival blood-vessels are involved. The hyperemia does not call for any special treatment, as it disappears spontaneously about the time convalescence begins. In the severe cases the instillation of a few drops of atropine is generally sufficient to cause a subsidence of the symptom.

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[6] Practical Medicine Series, 1917, Vol. I, pp. 148, 151; 1918, Vol. I, pp. 153-156.

Iridic irritation and iritis are, as a rule, coincident with the recurrence of the fever; sometimes they are late symptoms. In the iridic irritation we have double myosis with unequal pupils due to the difference in the amount of irritation present in the two eyes. This inequality of the pupils sometimes reverses itself. The pupils dilate slowly under atropine, and when dilation has attained the maximum the anisocoria disappears. Iritis with exudation into the posterior chamber occurred eight times, was generally of a mild character and ended in a complete restitution. Real synechiae are rare. One feature of this iritis is the ease with which the exudate in the posterior chamber can be seen, owing to the small amount of infiltration into the iridic tissue and the thinness of the posterior synechiae, as contrasted with the findings, for example, in syphilitic iritis. Atropine acts much more promptly in the cases under consideration than in other cases of iritis, for the reasons just given. The deposit on the anterior lens capsule, consisting probably of fibrin, disappears slowly, but is completely absorbed finally.

The conditions here described seem to the authors to prove the presence of the spirochetes in the uveal tract. The instillation of atropine for four or five days is advisable, even though most of the cases tend to spontaneous cure.

Of the two cases of optic neuritis one was bilateral. The fundus changes, while not severe, were readily recognizable. There was some lessening of vision but no retraction of the fields, nor was there a central scotoma. Both cases resulted in a complete cure. The one case of retrobulbar neuritis terminated favorably also in a short time. The authors think the presence of the spirochetes in the cephalo-rhachidian fluid was the causative factor. The one case of ocular herpes occurred early in the disease, and affected the lids, conjunctiva, and cornea. The icterus of the conjunctiva is a part of the general picture, and has, therefore, no local significance. In three cases subconjunctival hemorrhages were seen, being situated towards the inner and outer canthi in both eyes. In no case was a hemorrhage into the deeper tissues or into the orbit observed. The case reports of five cases are given in detail.

Lesions of the Cornea in the Austro-Italian War. F. von Herrenschwand[7] describes in detail seven cases of grave lesions of the cornea in soldiers who had for a long time been uninterruptedly exposed to glaring sunlight in an altitude of about 2,000 meters. At first they complained of burning and tearing of the eyes, then of intense pain incapacitating them for service. While ophthalmia nivalis in most cases is limited to inflammation of the lids and conjunctiva with intense blepharspasm, photophobia and pain, in the author's cases a severe lesion of the cornea was most conspicuous. In all the diseased area occupied the center and was elongated or round in only two cases. It consisted of a sharply defined indentation of a horizontal, narrow, ribbon-shaped area which spread toward the temporal side in the form of a disc. This shape corresponded to the slightly opened (on account of the glaring) palpebral fissure. The epithelium showed minute opacities, desquamation and, at some places, the information of blisters. In the severe cases also the deeper layers of the cornea were affected, presenting intense opacities. Mostly these were composed of minute, white dots. In two cases a secondary ulceration of the diseased cornea from the unclean conjunctival sac occurred.

Ophthalmia nivalis is generally ascribed to the injurious effect of intense violet rays, but occurs also in mountain climbing under a cloudy sky without exposure to direct sunlight. Two of the soldiers constantly wore yellowish green *coquilles* and still became affected. Herrenschwand thinks, therefore, that the inflammation is caused not alone by the ultraviolet rays but also by the direct effect of the cold to which the eyes of the soldiers

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(7) Centralbl. fur pkt. Augenhlk., vol. 40, p. 161.

are exposed. The diminished blinking of the lids required during strained observation does not protect the surface of rarefied air in higher altitude and an increased evaporation of the lachrymal fluid in consequence of cold winds are further deleterious elements. The formation of blisters in the diseased parts of the cornea does not invalidate this assumption, since blisters of the skin may occur in freezing of the second degree. That the changes in the cornea were so marked in these cases may have been due to the long and severe exposure.

Treatment with yellow ointment with an admixture of 10 per cent. Peru balsam was effectual. The violent subjective symptoms soon disappeared, and the course of healing was favorably influenced by it.

Recovery of Fields of Vision in Military Concussion Injuries of the Occipital Cortex. The following conclusions from the observation of seven cases are reported by M. L. Hine.[8]

1. In the case of an injury at or near the occipital pole the hemianopsia is very frequently complete, there being much less frequently macular escape than in the majority of cases with lesions (chiefly vascular) producing hemianopsia, met with in civil practice. This is explained as being due to the situation of the macular area in the cortex at the posterior end of the calcarine fissure, each half of the macula being represented on one side only, the right half of each macula in the right cortex, and the left half in the left. The more usual escape in civil practice is attributed to an overlapping of the arterial supply by the posterior and middle cerebral vessels.

2. The visual fields are gradually restored by recovery from center to periphery. It may be noted that a scotoma caused by loss of cerebral substance gradually contracts from periphery to center as the surrounding edema of the brain subsides.

3. The field of vision usually returns in the upper quadrant before the lower, and, in Hine's experience, never *vice versa,* this being due to the fact that all the injuries recorded here have been above the occipital pile, which is situated as a rule about 1 inch above the

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(8) Brit. Jour. Ophth., January, 1918.

inion. Hence, the occipital cortex above the calcarine fissure, which represents the lower part of the field of vision, has borne the brunt of the blow. Any injury below the occipital protuberance is much more likely to be fatal, owing to injury to the cerebellum and medulla, as pointed out by Col. Lyster and Lieut.-Col. Gordon M. Holmes, who have seldom obtained a record of a patient showing a superior quadrantic macular defect.

4. The restoration of function at first is incomplete, but when once it has commenced it seems to proceed in a definite order—color perception coming after the perception of white, even though the colored object is the larger, and, as recovery takes place the appreciation of colors becomes more and more acute. By this means, in suitable cases, one can roughly measure for clinical purposes the recovery of function in the macular area, and make comparison between the various quadrants affected, more elaborate and lengthier tests being as a rule impracticable with these patients.

5. It is important, when investigating any patient suspected of having had an occipital cortical injury, to use small colored test objects as well as the white, or a partially recovered lesion may quite readily be missed and the fields found to be full. This is the more important when one realizes how completely even a gross injury of the cerebral substance may clear up, and leave no trace behind. If this fact is borne in mind, quite a number of overlooked lesser injuries to the cerebral cortex of the occipital lobe (which could be classed as "concussion" or "contusion injuries" as Kinnier Wilson would prefer to call them) will be discovered.

6. On the other hand, in the more slowly and steadily recovering cases with subdural or extradural hemorrhage, there would seem to be no such separation between color appreciation and appreciation of a white test object. This could be explained by supposing a less severe injury to the macular area, while only a careful comparison of the color-fields from day to day could show whether they increased proportionally to the fields for white. Such examinations in almost all cases would be impossible on account of the patient's condi-

tion, and in the great majority of cases it would be unreliable.

Shrapnel Wound of the Eye and Orbit. Pte. G. A., aged 20, 54th Canadians, was admitted to King George's Hospital on Oct. 24, 1916. He was wounded on October 21 at Courcelette, he states, by "shrapnel." The left eye was markedly proptosed and apparently perforated, the tension being — 2. There was great chemosis of the conjunctiva, some blood visible in the anterior chamber, and the fundus was unilluminable. An inch and a quarter behind the left external angular process was a small wound, with ecchymosed margins, and some subcutaneous blood clot. There was great tenderness of the eye and parts adjacent to the orbit. There was no perception of light. Temperature 100° F.; pulse 64. No other wound, and the other eye was normal.

A radiogram taken by Mr. Ironside Bruce showed a "large fragment of shell casing lying behind the eye in the upper part of the orbital space, the posterior wall of the space being involved." On October 27, under chloroform administered by Mr. Harwood, after disinfection of the eye and wound, Sir William Collins[9] enucleated the lacerated globe. With the index finger he located the piece of shell casing fairly, firmly fixed into the orbital roof, while portions of bone, apparently from the great wing of the sphenoid, were extracted from the orbit. The fragment of shell was cautiously freed from surrounding semi-organized clot and periosteum, and then seized with sequestrum forceps and gently extracted. The wound in the temporal fossa had clearly been the site of entry, and some portions of the outer and upper wall of the orbit had been fractured. The impact of the fragment thus arrested in its course had, after penetration, been sufficient to the eye. Drainage tubes were inserted in both the orbit and the temporal wound, the edges of the latter having been excised. Convalescence was uninterrupted, and by the end of November the wound was healed, the socket healthy, and only some stiffness of the left temporalis muscle remained.

The piece of shell casing, erroneously but commonly

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(9) Brit. Med. Jour., Aug. 25, 1917.

described as "shrapnel," measured 17 x 11 x 8 mm., and was of irregular contour.

Injuries of the Eye Observed in the Fortress Hospital at Königsberg. Rosa Oleynick[1] reports on ninety-four injuries, fifty-four of which were perforating; of these twenty-six were produced by rifle shots. The most severe injuries were caused by rifle shots, due to their explosive action. Cases of intra-ocular foreign bodies were mostly due to artillery projectiles. In these cases Roentgen rays and the sideroscope were of excellent help in the diagnosis.

In one case the lower temporal portion of the cornea was hazy and the fundus much obscured. In the vitreous a fine opacity was visible and behind it a whitish area. The Roentgen skiagram showed a piece of projectile the size of the head of a pin, around which an exudate in the vitreous had formed. This was absorbed by iodide of potassium, inunctions and diaphoresis, after which the visual acuity rose from 5/35 to 5/8.

In a case of double perforation the wound of entrance was 5 mm. from the temporo-corneal limbus. The pupil reacted promptly. One and five-tenths disc diameters from the nasal border of the disc were several retinal hemorrhages, and in their midst a round, light-colored place, the exit of the foreign body, which, as the Roentgen rays revealed, was lodged behind the globe in the orbit. The macula was perfectly intact, and vision was normal.

Eleven cases of contusions were observed with changes of the interior of the eyeball from injuries to the orbital bones, the eyeball itself not being struck by the projectiles. The effect of this form of injury on the eyeball is a sudden indentation of the posterior pole, leading to rupture of the tense intra-ocular tunica, especially the chorioid, and profuse intra-ocular hemorrhage. After absorption isolated typical ruptures of the chorioid, concentric to the optic disc, are found; or the retina and chorioid shows multiple and irregular tears with secondary cicatricial processes, which appeared as whitish irregular, partly pigmented, foci (*retinitis proliferans*). The sudden indentation further leads to in-

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(1) Zeitschr. f. Augenhlk., vol. 34, p. 301.

crease of intra-ocular tension, the contents of the eye are driven forward, which may be followed by detachment of the retina, dislocation of the lens, iridodialysis; but the effect of contusions is mostly limited to the posterior segment of the eyeball. In four injuries of the optic nerve the eyeball appeared without irritation, only the wide, immovable pupil suggested the lesion.

Conservative Treatment of War Injuries of the Eye. Terrien,[2] as Chief of the Ophthalmic Center of the Ninth Military Area, has dealt with a large numer of cases of intra-ocular foreign bodies. While he advocates removal or attempted removal of the foreign body in the majority of cases, he is of opinion that in a certain proportion, especially when a moderate degree of sight is retained, it is inadvisable to operate. Such cases are those in which the eye has exhibited no signs of irritation, or, in other words, shows a marked tolerance of the penetrating particle. He publishes the notes of five soldiers, in each of whom the presence of a foreign body within the globe was proved by *x*-ray or ophthalmoscopic examination. In all these cases the wounded eye was free from pain, redness, or any other sign of reaction set up by the foreign body. In all, the eye retained some sight, and in one, vision was practically normal. In one man the fellow eye was badly injured and nearly blind.

It is noteworthy that none of Terrien's patients remained under his observation for more than three months; hence the possibility of the onset of trouble after a long interval can not be wholly excluded.

Sympathetic Ophthalmia in War Wounds of the Eye. Weekers,[3] among over 800 eye injuries, has not met with a single case of sympathetic ophthalmia. He points, as others have done, to the figures of former wars, where the disease was common. He analyses the few cases of sympathetic ophthalmitis reported during the present war by Valude (*Ann. d'Ocul.,* 1916, p. 89) and Birch-Hischfeld (*Klin. Monatsbl. f. Augenheilk.,* 1916, p. 257).

Weekers discusses the following questions:

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(2) Arch. d'Ophtal., vol. V, No. 11, p. 456.
(3) Arch. méd. belges, March, 1917.

What are the risks (to the second eye) of sympathetic disease?—Statistics in regard to this point show considerable divergence. For example, in wounds of the eye with penetration of foreign bodies, Ohleman found sympathetic ophthalmitis in 0.7 per cent.; Knies had 3 per cent. in wounds of the eye; and Hobby, 11.6 per cent. Similar differences exist as regards the frequency of the complication after surgical traumatisms. After removal of cataract, Eversbursch and Pennerl had 1.3 per cent. of sympathetic ophthalmitis; Agnew 2 per cent. or 3 per cent.; and Steffan no less than 21 per cent. The difference between the figures Weekers is inclined to trace to confusion between sympathetic irritation, on the one hand, and sympathetic inflammation, on the other. If typical cases of sympathetic inflammation alone were included, Weekers believes that the apparent frequency would be considerably reduced.

For purposes of prevention should we hasten to remove a wounded eye, already lost from a functional point of view?—There is nothing pressing about the matter, and we may in every case wait at least for a few days. Whenever the wound is such as to allow of the hope that the eyeball will keep its shape, Weekers believes that conservative means should be adopted. The condition of the wounded eye must be our guide. Should it remain painful and irritable for a month or six weeks after the injury, it must be sacrificed. We should not wait so long, indeed, if the globe appears to be on the way to atrophy or if exudative iridocyclitis develops in the injured eye.

Which should be preferred, enucleation or exenteration?—During the last eighteen months Weekers has not performed a single enucleation. He has resected the cornea and a narrow band of the neighboring sclerotic, emptied the content of the eyeball, and curetted the sclera with care. He claims that exenteration gives as much security against sympathetic disease as does enucleation, while the esthetic results are much superior.

Weekers does not share Meller's view, namely, that sympathetic ophthalmitis is due to the action of a microbe, which may (under certain circumstances still unknown) develop in the blood. Given a wound of the eye, this agent proliferates in the wounded tissues, its virulence augments, and it passes anew into the blood, whereby it reaches the other eye, where it sets up sympathetic inflammation. Dimmer inquires whether the extreme rarity of sympathetic ophthalmitis in war wounds is not a question of *terrain*. Can it not be explained by the good general health of soldiers, who are a selected body of men?

The present-day rarity of sympathetic ophthalmitis is to be explained, in Weekers' view, by the "vulgarization," so to speak, of asepsis and antisepsis, which tells all along the line—in first aid, during treatment, and in operations on the eye.

Ocular Symptoms in Trench Nephritis. Seventy or eighty soldiers from Macedonia, suffering chiefly from trench nephritis, were examined by T. Kirk.[4] They were chiefly between 20 and 30 years of age, and were examined with reference to eye complications. Nearly all presented marked retinal congestion, with large pulsating veins. There were no signs then of patches of exudation or nerve involvement. Some weeks later, however, more definite changes of nerve swelling, accompanied by patches of retinal exudation were seen. While the spots of exudation were generally in the usual situations, that is, near the disc and in the macular area, in no case was seen the typical silvery starlike figure of the chronic cases as figured in the text-books. Hemorrhage was not common. Those seen were of the small punctate variety, and not of the striate or flamelike character. The optic disc was often affected, the changes varying from a definite swelling to slight woolliness and indistinct edges. Small areas of edema were noticed, especially along the course of the veins. An important point was that in several of the series Kirk was able to trace the gradual absorption of some of the smaller patches of exudation.

Kirk believes that the pathology of this condition is probably an acute congestion resulting from some specific toxin, that the exudation which ensues is partly lymphoid and partly cellular in nature, and that this deposit probably clears up in the great majority of

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(4) Brit. Med. Jour., Jan. 5, 1918.

cases, without leaving any permanent results. The condition is one which is probably allied to the acute retinitis of pregnancy, scalatina and acute uremia, and should not be confounded with the retinitis of chronic kidney inflammation with its permanent changes in the retinal circulation vessels and tissues.

Effects of Distant Explosions on the Eye. Leplat's[5] patient was injured by an explosion from which the man was separated by a distance of from 1 m. to 1.5 m. The lesions affected the eye which at the moment was directed towards the mortar. They took the form of blood in the interior chamber, a zone of ciliary injection, reduced sight, and a pupil that dilated unequally when the eye was under the influence of atropine. All these had disappeared in sixteen days. The author has since observed the symptom-complex in three cases of contusion of the eye by a football.

Premature Enucleations at Base Hospitals. As F. de Lapersonne[6] points out, the tendency is to perform early excisions of badly wounded eyes. Yet it is rare that an eye has to be removed within twenty-four or forty-eight hours after a wound, and when this has been done it has frequently been the case that the tissues were badly slashed, foreign bodies and splinters of bone often left in the orbit, causing interminable suppurations, and leading to the formation of cicatrices which made the wearing of a prothesis almost impossible. Worse yet is the enucleation of both eyes, thus depriving the unfortunate soldier of all possibility of ever seeing again. The author cites a number of cases which were brought in after double enucleation, all of which were operated on either on the day they were wounded or within forty-eight hours, some of them having been seen to in a large ambulance at the front, the staff of which consisted of seventeen surgeons without a single oculist. There is no excuse for this undue haste, as the hemorrhage is never dangerous, panophthalmitis does not set in immediately, and the spreading of an infection to the meninges is certainly not prevented by a hasty enucleation; on the contrary, it is a fact that in deep

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(5) Arch. méd. belges, May, 1917.
(6) Arch. d'Ophtal., p. 449, vol. 35, No. 11.

wounds of the orbit with escape of cephalo-rachidian fluid enucleation is disastrous.

On the other hand some sight had been saved to eyes which seemed lost. If blindness is unavoidable it is much better that the wounded should be prepared for their loss gradually, and not subjected to such a terrible privation at a time when their moral and physical conditions are at their worst. On the other hand, it may happen that unlooked for improvement may set in after waiting a few days.

Dianoux,[7] like de Lapersonne, enters a *vigorous protest against enucleation of the eye so freely practiced since the beginning of the war*. A penetrating wound, treated scientifically, even if succeeded by ciliary reaction, he says, should be always followed by the cure and conservation of the eye. If in spite of all the situation is menacing, optico-ciliary resection or *"enervation"* should be adopted. Evisceration, too, is sensibly better than enucleation. Even a simple transverse incision into the eyeball with evacuation of the contents is to be preferred to enucleation, more especially if combined with the injection of vaseline or paraffin. In brief, Dianoux holds that when dealing with an ocular wound the eye, even if devoid of sight, should be kept or if operation be imperative, that evisceration should be performed, and that enucleation should be reserved for cases in which the eye is reduced to fragments.

Movable Stumps After Enucleation for War Injuries. *Terrien*[8] deals expansively with the various surgical measures advised or adopted *in endeavors to obtain a sufficiently prominent and movable stump on which an artificial eye may be worn*. He discusses the subject under four headings:

(*a*) Natural stumps: under which term are included shrunken eyeballs, and remnants of the eyeball left after amputation of the anterior segment or exenteration. In his judgment, the insertion of glass globes, sponge, paraffin, etc., in the empty scleral envelope should be abandoned as only temporarily useful. Sooner or later the foreign material is expelled. Moreover, these methods

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(7) Clinique Ophtal., February, 1917.
(8) Arch. d'Ophtal., June, 1917.

are not wholly devoid of the risk of sympathetic ophthalmitis.

(*b*) Anophthalmic stumps, including all procedures associated with, or undertaken subsequently to, enucleation. Such are the implantation in Tenon's capsule of inorganic substances, of portions of living tissue, *e. g.*, rabbits' eyes, skin, cartilage, and as accessory means the adaptations to the artificial eye of indiarubber globes.

(*c*) Artificial stumps, the adaptation of small moulds of the conjunctival cavity made of ebonite with an indiarubber envelope, or of paraffin or of the soft rubber employed by dentists for taking impressions of teeth.

(*d*) Contraction or destruction of the conjunctival culs-de-sac.

Terrien holds the opinion strongly that in war injuries the wounded eyes should seldom be removed by surgeons at the front. The patients should be sent to the base hospitals where there is time and opportunity to select that method of operating which promises to conceal resulting deformity to the greatest degree possible.

The author's conclusions are set forth as follows:

1. The stumps which give the best results are "natural stumps" (atrophic, painless globes, posterior segments of globes, scleral envelopes left after exenteration). Attempts should be made to obtain such stumps by conservative treatment, or by the various procedures for removal of the anterior segment of the eyeball, or by exenteration of the globe. By none of these methods can the risk of sympathetic ophthalmitis be wholly excluded, and they can not therefore be adopted systematically.

2. Enucleation, when necessary, should always be performed with care, and should be completed by the graft of a portion of costal cartilage, about 1.5 cm. in length, taken from the patient, into the capsule of Tenon. The tendon of each rectus muscle is sutured to the cartilage. The motility thus obtained is perfect, the sinking of the glass eye is obviated and the prothetic result is excellent. It is equal to that obtained by "natural stumps" and less dangerous, all risk of sympathetic ophthalmitis

being avoided. This appears to be the method of selection.

3. In default of a graft, and after simple enucleation, prothesis can be greatly improved by the employment of artificial stumps consisting of a hard ebonite shell in an envelope of soft indiarubber, which moulds itself to the bottom of the conjunctival sac, or by the use temporarily of moulds of soft wax introduced behind the artificial eye. This is an excellent method of remedying the unsightly sinking of the glass eye, and at the same time giving it a certain degree of mobility. It causes no discomfort to the individual, and it is only surprising that such means of remedying a deformity were not introduced long ago.

4. If the culs-de-sac are contracted, or irregular and will not hold an artificial eye, progressive dilatation by globes of increasing size is a simple and effective procedure. It is generally preferable to, and more successful than, any operative measures designed to restore a contracted conjunctival cavity.

A Cartilage Prothesis for the Eye. According to J. L. Aymard[9] the failure of the artificial eye from a cosmetic point of view depends upon two main factors, immobility and depression. The former condition is due to the absence of a mass of tissue fitting inside the artificial glass casing, and the latter to the fact that a sphere has been replaced by a shell.

However much ophthalmic surgeons may differ as to the value of metal or glass prothetic globes, plastic surgeons in general agree that there can be no question as to the superiority of the use of natural tissues. With this object in view, the writer now employs spheres constructed from costal cartilage (Fig. 8).

Since his investigations regarding the vascularity of cartilage he can understand how transferred cartilage rapidly establishes fresh communications with the blood-vessels in its new vicinity and becomes fixed to the capsule in a recent enucleation or to the surrounding tissues in older standing cases.

Figure 8-2 illustrates the portion, A A, of the eighth costal cartilage from which two hemispheres are tre-

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(9) Lancet, Oct. 27, 1917.

phined. These are then either pegged with cartilage or fixed with catgut.

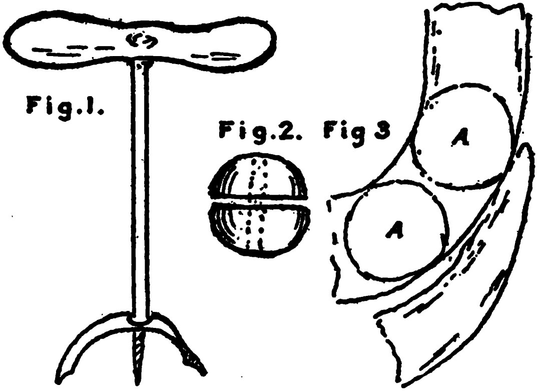

Fig. 8. Cartilage prothesis in enucleated eyes.

In primary enucleations, provided there is no sepsis, the surgeon places the cartilage sphere inside Tenon's capsule and sutures the same. He then proceeds to suture the conjunctiva. While the ophthalmic surgeon is enucleating the eye the second surgeon can, with practice, produce the sphere of cartilage.

Whether cartilage spheres can be introduced into a septic eye socket or not remains to be seen, but from experience in other directions the writer is inclined to think that it is worthy of extensive trial as the resisting power of cartilage to sepsis in nasal cases is remarkable.

Figure 8-1 gives a diagrammatic view of the trephine employed. The object of this trephine is not only to cut each hemisphere circular, but to shape it at the same time. The two points of the trephine have cutting edges, each made to cut in the same direction; the central pin is fixed and gimlet-shaped.

OCULAR THERAPEUTICS.

Ocular Remedies that Have Stood the Test of Time. Melville Black[1] has a good opinion of the healing powers of *zinc sulphate* one grain to the ounce frequently

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(1) Ann. Ophthalmology, January, 1917.

used. In acute conjunctivitis it should be used in an eye-cup every hour for the first day or so, and then less frequently until the disease is cured. After the removal of a foreign body from the cornea the writer fills the eye with 1/3000 *bichloride salve* and closes the eye with gauze and adhesive plaster. In his opinion, whenever the epithelium has been seriously disturbed by the foreign body or its removal, the eye should be closed until the damaged spot has healed.

Fluorescin as a staining agent for all kinds of corneal abrasions is most valuable as a means of diagnosis, as well as the only sure method of determining the progress of a corneal ulcer, and determining whether or not the part is entirely healed. A solution is used which is made by dissolving eight grains of fluorescin to one dram of liquor potassium, and distilled water added to make one ounce.

The author has come to depend upon *subjunctival injections* of cyanide of mercury in all severe infections of the cornea, iris and ciliary body. The strength varies from 1 to 1500 to 1 to 3000, depending upon the activity of the infection. The dose should be twenty-five minums. If one-third grain of novocaine is dissolved in the dose the injection is almost painless. *Iodide of silver* has been found to be of service in reducing all inflammatory conditions of the conjunctiva. The writer has found *blanching* of the *retinal vessels* by making pressure on the eyeball with the finger and observing the effect with the ophthalmoscope to be of value in detecting beginning high blood-pressure.

Ethylhydrocuprein in Diseases of the Eye. W. Zentmayer(2) gives the results obtained in three cases of pneumococcus conjunctivitis treated with optochin; in the first case, the inflammation was of less than twenty-four hours' duration and one instillation of the drug resulted in a cure; in the second, the organisms disappeared on the fourth day and on the sixth a cataract was extracted with perfect healing; in the third case, the process had lasted two weeks, with improvement at first and then a relapse, and five months later the eye was still inflamed and other organisms were present in the secretion. He emphasizes that the drug should be used with extreme caution in view of the fact that Oliver asserts that cases have been reported in which the instillation of a 1 per cent. solution produced rapid destruction of the cornea; that other methods be used in conjunction; and that the toxicity of the drug should be remembered when injecting the solution into lachrymal passages.

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(2) New York Med. Jour., Feb. 24, 1917.

Zentmayer gives brief histories of eight patients in whom the remedy had been used for pneumococcus ulcer of the cornea. In regard to the method of using, he points out that the drug is supplied in its basic form and as a hydrochloride. The latter is soluble in distilled water up to 5 per cent. strength. Clinically, the hydrochloride has usually been employed, in 1 and 2 per cent. strengths. The method which appears to give the best results in the treatment of corneal ulcers is that proposed by Kummell. A 2 per cent. solution is daily applied to the ulcer by means of a small cotton pledget and a 1 per cent. solution is instilled hourly into the conjunctival sac. Schwartzkopff used to advantage a salve of optochin hydrochloride 0.1, atropine 0.1, amyl 2, vaseline 10, applied every two hours. For the relief of blepharospasm and photophobia a 5 per cent. solution is instilled, and repeated, if necessary, every two days. As the drug is, in all strengths, painful, it would seem advisable to precede the use of the stronger solutions with an anesthetic.

Zentmayer remarks that ethylhydrocuprein is a valuable aid in the treatment of pneumococcus infections of the eye and that it often acts as a specific in pneumococcus ulcers of the cornea, especially if the treatment is begun before active tissue destruction has occurred and that the course is shorter and much more favorable than was the case of those treated by the methods used in earlier days. The evidence at hand as to its value in diseases of the cornea and conjunctiva due to other organisms than the pneumococcus or to other causes is insufficient on which to base a conclusion.

Experiments With Thorium-X on the Eye. K. Stargardt[3] injected neutral solutions of thorium-*x*, in quantities equal to the radiation of 0.0045 resp. 0.00225 mg. radium bromide into the anterior chamber, and solutions equal to the radiation of 0.009 radium bromide into the vitreous, of rabbits and reports on his experiments in detail. From two to four weeks after the injection into the anterior chamber a very characteristic decoloration of the iris was observed, due, as the histologic examinations showed, to a decay of the chromatophores and more or less severe lesions of the remaining tissue of the iris, especially the endothelium and the walls of the blood-vessels, and of the endothelium of the cornea, sometimes leading to its complete destruction.

Injections into the vitreous destroyed directly or indirectly the parts of the eye, most important for vision: liquefaction and opacities of the vitreous from accumulation of lymphocytes, destruction of all layers of the retina, necrosis of the retinal vessels atrophy of the optic disc and obliteration of the vessels, disappearance of the stroma cells of the chorioid and changes of the chorioidal vessels like those of the retinal vessels.

The ciliary body showed strikingly slight alterations. Clinically, the iris presented no changes, but histologically the chromatophores were disintegrated, and the vascular endothelia were slightly affected. The cornea, especially the endothelium, was normal in all cases. The lens fibers were swollen or converted into fine detritus, and the lens contained numerous vesicular cells and Morgagnian globules. Differing from Abelsdorff, Stargardt attributes these changes to a direction lesion of the lens by the radiation.

The writer concludes that thorium-*x* solutions can not be used therapeutically on the eye, because we do not know how long thorium-*x* and how long its products of disintegration remain in the eye and because the solutions contain all kinds of rays, the therapeutically active gamma rays and the therapeutically inactive, even inocuous, alpha and beta rays, which can not be separated in solutions.

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(3) Zeitschr. f. Augenhlk., vol. 34, p. 195.

NEW INSTRUMENTS.

A New Cataract Knife and a Knife for Dacryo-rhinostomy. The cataract knife to be used for cataract operation where the eyes of the patients were so small and deeply seated that the greatest difficulty was experienced in making the corneal sections with a linear knife has been devised by Melville Black[4] (Fig. 9).

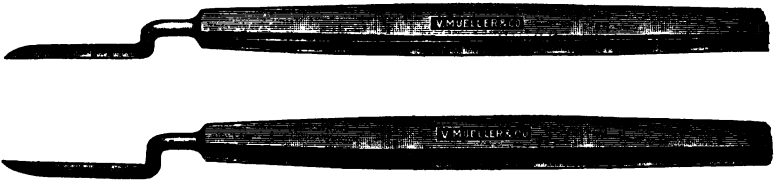

Fig. 9. New off-set cataract knives.

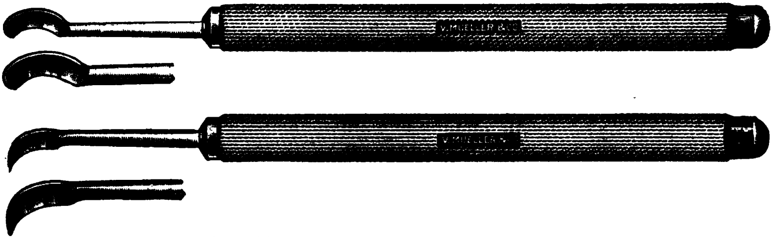

Fig. 10. Dacryorhinostomy knives.

The dacryo-rhinostomy knives are intended to be used to cut away the thin bony wall between the lachrymal sac and the nose and thus make it possible to cut this opening from the ocular side rather than from the nasal side.

A Precision Trial Case and Test Frame. C. F. Prentice[5] describes the so-called ophthalmic test frame or portable phorometer (Fig. 11).

It is designed independently to place the optical center or centers of one or more very thin plano-convex and plano-concave trial lenses of small aperture in per-

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(4) Ophth. Record, February, 1917.
(5) Ophth. Record, April, 1917.

fect alinement with the visual axis of each eye. It essentially consists of a white metal front containing a pair of laterally adjustable lens-cells, adapted to hold even four superposed lenses, combined with a vertically adjustable nose-piece and a pair of slightly curved flexible steel temples, whose tension may be so regulated by thumb-screws as to comfortably cling to the patient's head, through lateral pressure at the back of the head above and behind the ears. Each temple near the point of its attachment to the front has a joint which is capable of being tightly clamped by a thumb-screw, in order to provide for the proper inclination of the lenses for reading at finite distances. Just in front of each temple-joint is mounted a milled head and graduated scale through which a transverse sighting device may be adjusted to measure the interpolar distance between the lens and the cornea of each eye. This is a very important provision, especially when menisci, contra-menisci, or Punktal lenses, designated in vertex-refraction, are intended to be used as the substituted lenticular corrections.

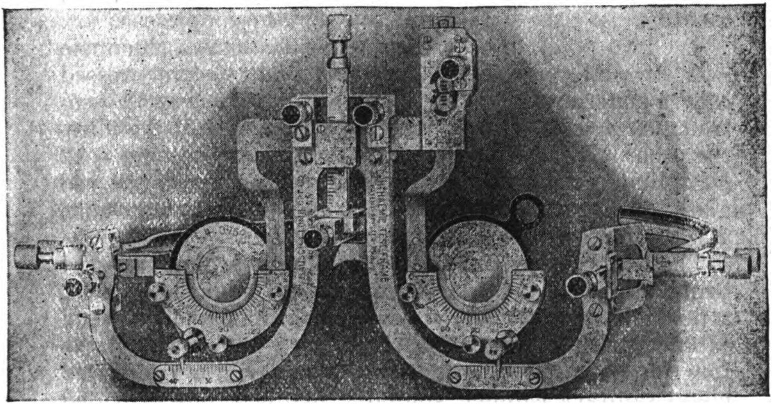

Fig. 11. Ophthalmic test frame.

The trial case contains:

1. Forty pairs of spheric convex lenses and forty

pairs of spheric concave lenses, numbered in eighths from 0.12 D. to 1.75 D., thence by quarters to 3.5 D., thence by halves to 8 D., and thence by units to 20 D.

2. Twenty-eight pairs of convex cylindric lenses and twenty-eight pairs of concave cylindric lenses, similarly numbered between 0.12 D. and 8 D.

3. Eighteen prisms, numbered ½△, 1△, 2△, 3△ and 4△, in pairs, the remainder being numbered 5△, 6△, 8△, 10△, 12△, 15△, 18△ and 20△ (prism-dioptries).

4. Two polar discs, two pin-hole discs, two stenopeic slits, two Maddox rods (red and white), two crossed contra-generic 0.25 D. cylinders and two crossed contra-generic 0.50 D. cylinders, one pair having handles, the other without handles; one Maddox prism, one +12 D. cylinder, one opaque disc, one ground glass, one red glass, one green glass, two blue glasses and two smoke glasses in shades B and D, respectively.

These complete sets of trial lenses are at present being supplied in three styles of assemblage, namely, a portable leather-covered case; a white enamelled wood cabinet, with drawers for accessories and a receptacle for the portable phorometer; and a white enamelled metal sanitary cabinet, similarly planned, but provided with disinfecting arrangements.

A Protective Eye Shield. Since the almost complete disappearance of the bull's eye watch crystal from the market, the difficulty in securing suitable glass shields for protecting the non-infected eye in cases of purulent

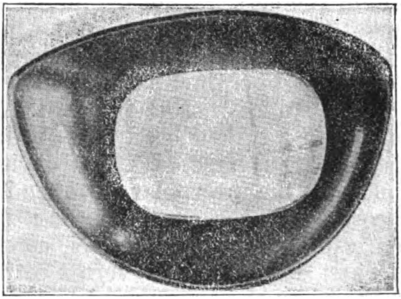

Fig. 12. Patton's eye shield with glass window.

ophthalmia suggested the shield here illustrated. James M. Patton[6] first had a large drop oval cut from a plano toric blank, but this was discarded as it would not be adapted to the shape of the orbit and cheek. A round window of glass was then placed in the regular "Shado" eye-shield, which was later enlarged as shown in Fig. 12.

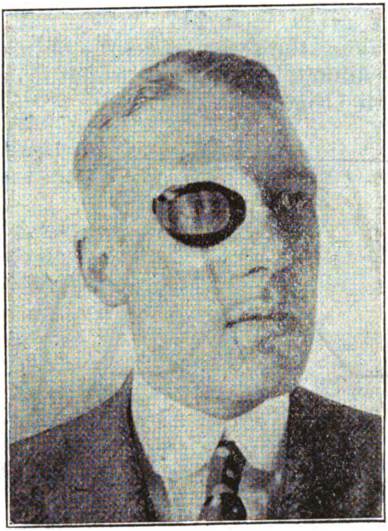

Fig. 13. Patton's eye shield in position.

This shield is accurately shaped to fit the brow, nose and cheek, gives a wide range of vision, is easily sterilized, and can be firmly held in position with adhesive strips or better, by a narrow strip of collodion and cotton, as shown in Fig. 13. An open space should be left at the outer angle for ventilation.

Sight-Testing Obturator. A sight-testing obturator, consisting of an opaque screen with handle attached and a spring clip to fix it in position for use is pictured by A. B. Galloway.[7] The opaque screen is of such size, and has a curved portion of such shape and

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(6) Ophth. Record, November, 1917.
(7) Brit. Med. Jour., Feb. 10, 1917.

size cut out of its lower part, that the eyes of a person under examination can be alternately occluded and uncovered, and their separate vision determined, while that person has no knowledge as to which eye is being tested at any given moment. When not in use, the handle folds along the screen, and the obturator may be kept in the ordinary lens case, to which it makes a very useful addition (Fig. 14).

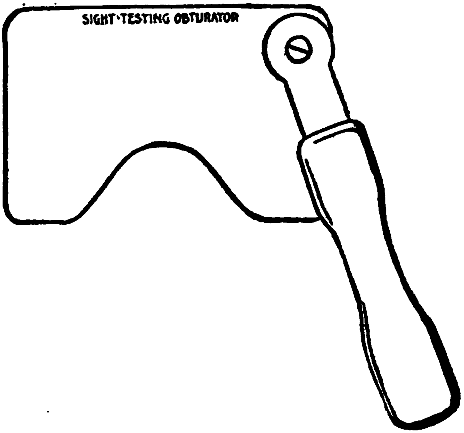

Fig. 14. Sight testing obturator. Open; when closed, the handle is moved upwards and lies parallel with the upper edge.

When in use, the handle is sprung into position, the examinee is asked to keep both eyes open, and to read Snellen's distance type from above downward at the test distance. The screen is lowered from above downwards over one eye and the vision of the other noted. Then, by slight lateral movements of the obturator, the eyes may be alternately occluded and uncovered without conveying any information as to which eye is being examined at any one moment. Certain would-be malingerers imagine they are looking through glasses and think it safe to read an extra line or two; others say they can not see through the dark ''glass'' when the tor takes advantage is that, under ordinary circuminstrument is in use. The principle of which the obturastances, an individual can not say what is seen by the right and what by the left eye.

The advantages claimed for the appliance are that it affords:

1. Great facility in testing the visual acuity of each eye separately and of both together when dealing with a large number of persons in rapid succession. The position of the examiner's arm is much easier when using the obturator than when holding a card or other opaque object first in front of one eye and then the other.
2. Easy detection of malingering, as the person examined does not know which eye is under examination.
3. Rapid demonstration of latent deviations, of slight squints, and of amblyopia ex anopsia.
4. In artificial illumination the obturator forms its own shade for the eyes that are being tested.

A Simple Rapid Perimeter. The accompanying illustrations (Figs. 15, 16, 17) are those of a perimeter that may be used at the bedside or in the office, that will tire neither the patient nor the examiner, and, as claimed by N. W. Price,[8] is rapid and accurate.

A is a dial marked off in divisions of five degrees, each half beginning at zero and ending at ninety degrees. This dial carries a hand which is attached to a bevel gear so that when the arm C is carried over an arc of 90° the hand passes half way around the dial. The front part of A which is marked (b) turns on the back (a), much as a nut turns on a bolt, but arranged so that its excursion is only 180°. The small projection at A marks the angle of this excursion on the side of the instrument which is divided into divisions of fifteen degrees, not shown plainly on the figure. C is an arm thirteen inches long, carrying at B a cube each side of which is one sq. cm. and is colored either white, red, blue, green and yellow, while the remaining side is divided in quarters, each quarter colored either white, red, green and blue. Thus five faces have squares 10 mm. across while the small ones are 5.

D is a handle for the oculist to work the arm and yet have his fingers outside of the lines of vision of the

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(8) Ophth. Record, May, 1917.

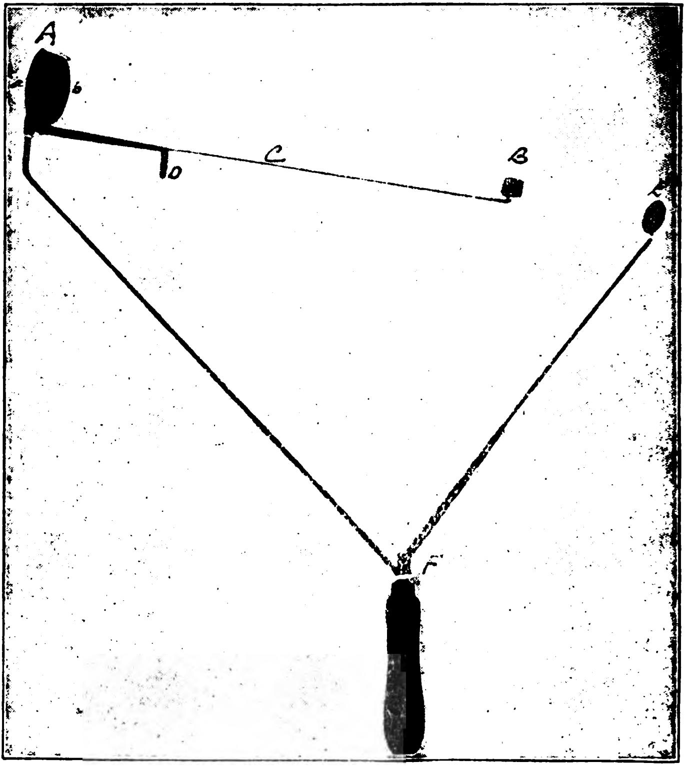

Fig. 15. New perimeter.—(Price.)

patient. E is a small mirror and F is a hinge simply to fold the instrument in a small space.

The patient takes the instrument in his own hand and places the point A just under either eye and looks in the mirror, the remaining eye being closed. He is to watch the image of his eye in the mirror, thus keeping his line of vision perfectly straight with the instrument. The oculist now places the dial at any angle, say so that a line through 0° and 90° forms a vertical line, then the arm C will move horizontally through an arc of 180°. The patient sees how far he can see

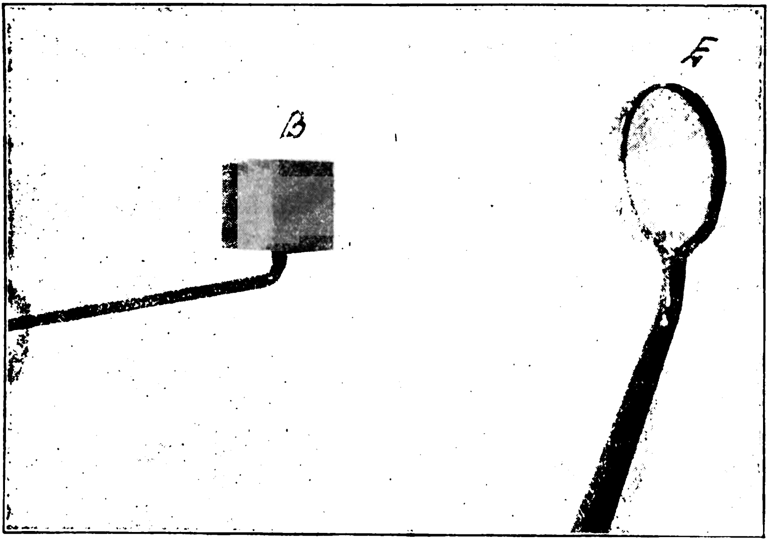

Fig. 16. New perimeter. Close up, showing mirror and color carrier.

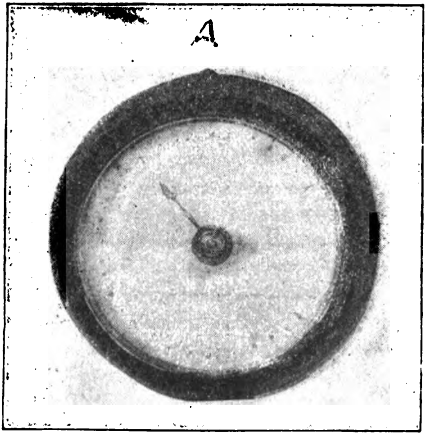

Fig. 17. Dial to record the degrees.

the color facing on the cube, as in any other perimeter. Then the line through 0° and 90° may be turned at any other angle with the arm C always at right angles to it.

The inventor claims:

1. It is accurate, and consumes much less time than the old perimeters.
2. It is comfortable for the patient and oculist, as both are sitting and patient's face is not held rigid.
3. It may be used anywhere, in the office, in the hospital, or at the bedside.
4. It is comparatively cheap, and takes up little room, and is so handy no dust need collect on it from disuse.

The Ear

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DISEASES OF THE EAR.

GENERAL CONSIDERATIONS.

Educational Deafness. This subject is discussed by M. Yearsley,[1] who defines the condition as a degree of deafness which prevents a child from obtaining the full benefit of ordinary education in an elementary hearing school, and necessitates his being taught in a special deaf school or "hard-of-hearing" center.

The cases are classified as congenital cases, acquired cases and doubtful cases. Of the 645 congenital cases, consanguinity, illegitimacy and syphilis are given as the causes.

1. Consanguinity: Sixteen were the offspring of first-cousin marriages; three of the marriages of second cousins; four of the marriages of cousins whose degree was not ascertained (in one of these the child was also illegitimate). In one additional consanguineous case the father of the child was also the father of the mother.

2. Illegitimacy: This occurred in twelve cases (2.1 per cent). Mygind discusses illegitimacy as a possible factor in deaf-births, and points out that the comparatively small number of illegitimate deaf-mutes may be owing partly to the high mortality which prevails among children born out of wedlock, but the difference between illegitimate births in general and in congenital deafness cases in particular is so considerable as to suggest that illegitimate children are less liable to deaf-mutism than others, possibly because illegitimate unions are seldom consanguineous.

3. Syphilis: While so many of the earlier investigators have spent much time seeking to establish the value of consanguinity, illegitimacy, maternal impres-

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(1) Jour. Laryngol., Rhinol. and Otol., April and May, 1917.

sion, and other minor factors in the causation of deaf-birth, to the neglect of more important lines of research, it has remained to Kerr Love to approach the problem from a much wider purview. Having separated hereditary deafness from sporadic deaf-birth, he has established, once and for all, some of the serious causes which underlie the latter. Kerr Love looked at it from the social aspect. He found that "the social status of the families from which the deaf children of Glasgow come is that of the house of one apartment." The conditions under which the poorest classes exist—it can scarcely be called living—mean those of overcrowding, carelessness of child health, uncontrolled abuse of alcohol, and especially, as Kerr Love has emphasized, untreated syphilis—conditions all of which make for a high infant mortality and a high rate of deafness. Few people realize the potency of these deplorable conditions as factors of disease, or, to speak more plainly, many people know it, but few realize it—the awful and continual struggle for existence that goes on among families of the poorest classes. Parental neglect is rife, and instances are of daily knowledge in those whose duty brings them in contact with the submerged portion of our great cities. Dire poverty and squalid overcrowding are, almost of necessity, associated with neglect of children. The duties of parents often seem to cease with the birth of their children.

The conditions under which the poorest class is to be found mean poor air, poor food (and very little of it), poor clothing; all of which besides the results of untreated syphilis, react disastrously upon the child's mental and physical development. Yet the poor child is not born physically worse off, the fault lies not in Nature but in nurture. He falls an easy victim of disease, and especially to those diseases which destroy the organ of hearing in early life, and so cause acquired deafness. There is, or, until recently, there was, no apparent reason for sporadic deaf-birth, unless there was some poison which could destroy the hearing before birth. Kerr Love has pointed out that such poison does exist in syphilis.

The prevention of the causes leading to the deafness in the cases under discussion is largely the prevention of infection of the naso-pharynx. In a great number of instances it resolves itself into the perennial question of adenoids. Out of 232 cases of non-suppurative middle-ear deafness, 132 or 61.2 per cent., could be definitely ascertained to be due to adenoids; while in the 214 middle-ear suppuration cases, 55, or 21 per cent, similarly originated. That is to say, adenoids were responsible for at least 41.9 per cent. of the cases of primary ear disease. Probably the percentage, could one have obtained reliable histories in the remaining cases, would have been a much higher one.

Much has been written on the etiology of adenoids, but, if one boils it all down, it resolves itself largely into two main facts: faulty environment and infection. The conditions under which the children of the poor exist in large cities are eminently fitted for the production of adenoids.

In discussing etiology, three factors are considered: heredity, faults of hygiene, and faults of diet. Confinement to hot rooms and a town life are important causes. Air-borne respiratory infections are very common, even in hospitals, and something is to be said as to the evils of the "hospitalizing" of infants. Among faults of diet, artificial feeding and excess of one constituent (generally sugar or starch) in the food are prominent.

The prevention of ear disease, when once the potential cause of adenoids and the catarrhal state are present, next claims attention. In cases classified here as those of deafness due to primary ear disease, it was a noteworthy fact that one frequently found two statements volunteered: (1) that adenoids had been removed more than once; and (2) that an operation for adenoids had been followed by an increase in the deafness. These statements suggest that there is something radically wrong in the operation done, or in the after-treatment, or in both. In some cases examination established the fact that the adenoids had not been sufficiently removed. The majority of these patients had been operated upon at large hospitals; those who had been treated at special hospitals were not a great minority. The result of inquiry often suggested that, in many instances, the removal of the adenoids seemed to have been the only aim of the operation, and that where the enlarged pharyngeal tonsil had infected the nasal passages, no means had been suggested or taken to cure the latter, and so prevent a later reinfection of the nasopharynx. One realizes the enormous pressure of adenoid cases at hospitals, but there is no reason why organization should not overcome defects of administration, and consequent discredit of a valuable operation. Probably a good deal of blame rests with the ignorance of parents, but it is difficult not to assume that some of it lies with the surgeon.

The treatment of ear disease, once established, must be divided into the treatment of suppurative and non-suppurative middle-ear conditions. Are the suppurating ears of childhood always treated as they should be and, above all, are they always treated with due regard to the preservation of function? The cases one encounters in schools for the deaf suggests a reply in the negative. Medical journals are always publishing papers on the treatment of discharging ears; many of them contain valuable suggestions, but signs of these being carried out are not always visible. The children of the poor are bad subjects for middle-ear suppuration, because they are so frequently reinfecting their ears from their upper air passages. They are the *bête noir* of out-patient departments, and the persistent attendants of school treatment centers. The main points about their management lie in two directions: (1) It is useless to attempt to check a discharging ear by local measures so long as reinfection from the nose is apt to occur; and (2) the original exceptions of the radical mastoid operation have not been realized, *i. e.,* the operation does not cure in every case. Probably, as Bardes puts it, in children it is better whenever possible to do a simple opening operation, as more likely to preserve hearing whilst obtaining effective drainage.

With regard to the treatment of catarrhal middle-ear deafness, the difficulties seem even greater than with suppuration. One thing seems needed, and that is better after-treatment of adenoids. Here, again, the blame lies often with the parents, and the over-pressure in out-patient departments adds to the difficulties. It were better if children were not mixed up with adults in aural clinics. Better still would be the appointment of otologists to the care of school treatment centers, where only school children are dealt with.

The defective hygienic surroundings of many of our school children must bear a part of the blame. Better housing, better sanitation, and better feeding would all contribute to better results in the treatment of ear disease in children.

Significance of Sudden and Profound Deafness. This is discussed by O. J. Stein.[2] To draw an absolute line of distinction between this and all other forms of deafness he recognizes as impossible, but it is practicable to separate them into two groups for the purpose of aiding in the diagnosis and of rendering immediate first aid in order to avoid irreparable damage. Hearing many times is relative, so far as it is a symptom, but when a person with normal or satisfactory hearing rapidly loses all of the hearing in one or both ears, his condition assumes a significance distinctly in a class of its own.

The symptomatology in a patient stricken with sudden and profound deafness is often that of Ménière's syndrome: that is, sudden deafness with tinnitus and vertigo, occasionally nausea and vomiting, and at times loss of consciousness. But the pathogenesis, as well as the location of the lesion, determines the presence or absence of these and other symptoms that may be present, such as nystagmus, facial paralysis, ataxia, headache, aphasia, convulsions, hemiplegia, mental bewilderment and, in case of a petrous fracture, a serosanguineous discharge from the ear and nose. The tests show obliterated perception of all ordinary sounds. Sometimes there may be gaps in the hearing scale where some slight perception still lingers, but oftentimes the supposed remnants of hearing are only perceptions of other sensations like those of touch, temperature, vibration and vision.

Consideration of the fact that malingering and hys-

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(2) Jour. Amer. Med. Ass'n., Sept. 1, 1917.

teria may contribute to the exhibition of these symptoms should at all times be in mind, but ordinarily such causation may be dismissed. In traumatism, the causative factor is so apparent that only occasionally will the diagnosis be obscured. The same may be said of the occupational causes an example of which is seen in the caisson worker. A few cases may be caused by toxicities, either drug or disease, although ordinarily such exciting factors bring about a more gradual loss of hearing. Following the use of salvarsan or its allies, complete paralysis of the eighth nerve has been reported at various times. In a similar way anaphylactic cases may occur following the use of certain serums. The greater number of cases are caused by certain systemic diseases like syphilis, the various anemias and leukemias, diabetes, arteriosclerosis, mumps, pertussis, and, as mentioned before, in some of the suppurative ear diseases. Also among the insane this type of deafness occurs.

The site of the lesion directly causing the symptoms of deafness may be in the labyrinth, in the eighth nerve or in the cranial cavity, the labyrinth cases being perhaps the more numerous. The causative factor may operate directly on these centers or indirectly through neighboring channels. Both the vestibular and auditory functions may be involved simultaneously or separately. Ordinarily disorders of the conduction apparatus rarely cause sudden and absolute deafness.

Hemorrhagic effusions into the labyrinth will bring about sudden and complete loss of hearing. In injuries due to a fall or blow, the hemorrhage frequently becomes manifest, but occasionally it is concealed, thus obscuring the direct cause of the deafness. In the apoplectiform variety of hemorrhages, such as occur in hematopoietic disorders like pernicious anemia, leukemia and chlorosis, the deafness is usually sudden and profound. In the labyrinth cases that are due to congestion or anemia, the deafness and tinnitus may be only temporary, while the hemorrhagic cases and those due to emboli are far more serious and profound.

In syphilis and suppurative ear cases there is more often a history of various degrees of vertigo and perhaps tinnitus before the grand attack.

In the labyrinth cases complicating either acute or chronic middle-ear suppurations, there may result sudden and complete deafness either alone or associated with vestibular disturbance; but more usually this deafness is not sudden or complete at once, unless from rough or unnecessary manipulation during operation or treatment. In the serious type of labyrinthitis the hearing usually returns on convalescence or recovery.

Of the constitutional causes the syphilitic cases are probably the most numerous. In these cases the lesion may be due to the toxins or to a gumma. In some cases it may be due to a destructive process and an endarteritis or an acute inflammatory process. The site of the lesion may be in the labyrinth, in the nerve or in the brain centers, and it may occur in either the acquired or the hereditary cases. In the acquired form a neuritis from the toxins may occur as early as the primary period of the disease, although more commonly the changes show later during the secondary and tertiary stages, which may be years after the primary and after a presumable cure.

In these cases there may be hemorrhagic areas. The labyrinth and its nerve may show round cell infiltration and beginning atrophy in the spiral ganglion, lamina spiralis and the nerve. The inherited cases may occur at any age; often in the babe, deafmutism results. Again it may occur just before puberty, when it is recognized as one of a triad of symptoms, namely, interstitial keratitis, notched incisor teeth and deafness. The disease may originate endocranially as a meningitis or an endarteritis, and then extend along the nerve and vessels to the labyrinth.

A meningic deafness that may accompany cerebrospinal meningitis is usually sudden and profound, and is due to a diffuse labyrinthitis. Its appearance at the time may be overlooked, owing to the crisis present of the fever itself. The drum and middle ear are almost always normal or nearly so, differing in this from panotitis seen in scarlet fever and measles. All these cases assume an importance much beyond the average case of deafness and much beyond what many physicians appear to recognize. With a fuller knowledge of their seriousness, many of these patients might be rescued from a probable hopeless and helpless future. By instituting prompt and vigorous measures in treatment, some of them can be cured or at least greatly benefited. Auditory reëducation will benefit a certain number. Where such gratifying results are impossible, the prompt employment of lip-reading as a new education should be advised.

Deafness and Despondency. These conditions are close friends according to W. C. Phillips.[3] Deaf people are extremely sensitive regarding their affection and usually will make every effort to conceal this defect both from their friends and their employers. Fear of losing their employment may be the chief underlying feature but their extreme sensitiveness is manifest even when independent. It has been aptly said that the blind are less despondent for the reason that "if you speak to a blind man you make him forget his troubles, while if you speak to a deaf man you remind him of his troubles." When the deafness is profound and affects both ears so that the individual is unable to converse readily with his friends and to hear conversation in the ordinary events of social life he is prone to give in to his despondency, to absent himself from all social intercourse, and to become more or less a recluse.

Acquired Deafmutism. As the most frequent cause of this condition J. F. Fraser and R. M. Muir[4] class congenital syphilis next to cerebrospinal meningitis and middle ear suppuration. There is reason also to believe that many cases of so-called congenital deaf mutism are really due to intra-uterine syphilis or to syphilitic changes in the ear occurring before the child has learned to talk. Alexander states that the most severe forms of ear syphilis occur in intra-uterine life. The newly born infants show all the signs of congenital deafness and the static labyrinth is not excitable.

Statistics as to the frequency of deafness in children suffering from congenital syphilis vary very greatly. Some authorities put it as high as 60 per cent., others at only 33 per cent. In twenty-one syphilitic families

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(3) New York Med. Jour., Dec. 22, 1917.
(4) Jour. Laryngol., Rhinol. and Otol., January, 1917.

Kerr Love found that there had been altogether 172 pregnancies of which thirty resulted in miscarriages or still-births. Of the 142 children born alive, forty-five had died, thus, with the miscarriages and still-births, giving a total of seventy-five deaths. (Among the forty-five deaths which occurred after birth there were many cases of meningitis). Of the ninety-seven individuals living at the time of examination thirty-one were deaf and blind. Of the sixty-six living children who were neither deaf nor blind, many had been born before the parents contracted syphilis. Yearsley found that 3/5 per cent. of children in the London County Council deaf mute schools were suffering from congenital syphilis. Siebenmann, of Basle, gives percentage of 5/6, and Beck of 8/1 as representing the cases of congenital syphlitic deafness among deaf-mutes. E. Urbantschitsch has examined the Wassermann reaction in 125 deaf-mutes and found it positive in thirty-three. Kerr Love had the Wassermann reaction tested in 157 cases, mainly collected from the deaf and dumb institutions of Glasgow, and obtained a positive reaction in forty-eight and a doubtful reaction in eight. Kerr Love maintains that the late type of congenital syphilitic deafness is usually an evidence of expiring syphilitis. He holds that the Wassermann reaction does not discover all the cases of congenital deafness which is due to congenital syphilis because, when no active process, apart from the deafness, is going on, the Wassermann test sometimes gives a negative result. When syphilis has become latent the reaction is negative in fully 50 per cent. of cases. By the time a congenitally deaf child has reached school age the syphilitic poison has "burned itself out," so that a positive reaction can not be obtained. In other words, some cases of congenital deafness are syphilitic, although the blood reaction is negative. O. Mauthner makes the remarkable statement that in 1 per cent. of all men unfit for military service (active or auxiliary) syphilitic affections of the ear are the cause of disability. As recruits are called up for examination at the age of 18 years the syphilitic affection must be congenital in almost all cases.

THE EXTERNAL EAR.

A Post-Aural Fistula. In this case, the fistula was successfully closed by L. J. Curtin.[5] It was caused by a slough following a radical mastoid operation. In closing, an incision was made ¾ of an inch back of the original incision. The skin was dissected up and sutured to the anterior flap. This allowed a broad gaping wound in the line of the second incision. This was closed by a skin flap from the inner side of the arm, held in position by sutures.

Gastric Symptoms Due to Irritation in the External Auditory Canal. Four cases are reported by M. Goldsmith.[6] Two of the cases are reported as follows:

Case 1.—S. L., girl, aged 12, was referred by her family physician on account of persistent vomiting. From 2 to 4 years of age, she suffered from some digestive disturbance. Since then her health had been good until the beginning of the present trouble. Two years before, supposedly because of worry over her father's illness, she began to vomit. Vomiting occurred immediately after eating. It was independent of the character of the diet, and consisted only of the food last taken. It was sometimes followed by pain in the epigastrium, and was much worse in summer than in winter. The child was under-nourished, probably because of inability to retain sufficient food. Complete physical examination, including that of the digestive functions, failed to reveal anything abnormal. In one ear was found a mass which proved to be a glass bead, lightly covered with cerumen, and removal of this gave complete and permanent relief.

Case 2.—F. H., a waiter in a down-town restaurant, had not been ill since an attack of typhoid fever nine years before. He admitted gonorrhea, but denied syphilis. He used very little alcohol and no coffee or tea, but drank much ice water and ate large quantities of fruit. He never suffered from digestive disturbances until two weeks before consulting Goldsmith. At that time he began to suffer from nausea on arising and was

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(5) Jour. Laryngol., Rhinol. and Otol., February, 1917.
(6) Jour. Amer. Med. Ass'n., March 17, 1917.

unable to eat much breakfast. The attempt to eat caused some dizziness and a sensation of strangling. There was no pain, but he experienced a sensation of heaviness in the epigastrium. On each of the last four mornings he vomited half an hour after breakfast. The morning nausea would continue until 1 or 2 p. m., after which he could eat a fair lunch and a good evening dinner, having no discomfort during the rest of the day beyond what he described as a heaviness in his head. The history was atypical of any gastric disease, and suggested a reflex origin. Examination showed impacted cerumen in both ears, and immediate relief followed its removal. The patient subsequently told of having had wax removed several times before, but on no occasion had there been any gastric disturbance.

Bilateral Congenital Osseous Atresia of the External Auditory Canal—Good Result Following Surgical Restoration of the Canal. This case is reported by L. W. Dean and T. R. Gittins.[7] The left ear was operated on with the hope of establishing a meatus, the supposition being that the perceiving apparatus was intact and functionating.

Operation: The left mastoid was opened and a simple mastoidectomy was done in the usual manner. Cells seemed to be normal. The antrum of the mastoid was found, aditus was approached and enlarged until the incus was well exposed. The incus appeared normal and movable.

Taking the floor of the aditus as a guide for the facial, the bone external to the tympanic cavity was attacked. Solid bone about one-third the thickness of a normal canal, was found between the mastoid cells and glenoid fossa. This was removed, with the burr working outwards to the concave area representing the external meatus. No annulus could be detected. Just external to the proper position for the annulus, a small cavity 3 mm. in diameter, was found. This communicated with the tympanic cavity by means of a very small opening into which a mastoid seeker fitted tightly. No evidence of a drum head was to be seen. A seeker introduced from without into this aperture caused a movement of

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(7) Jour. Opthal. and Oto-Laryngol., July, 1917.

the incus. The external wall of the tympanus was so constricted in the anteroposterior direction that it was not considered advisable to attempt the enlargement of this opening. The solid bone was removed externally to the concave depression in the concha. A large opening was made in the concha. The mastoid cavity was lined with Thiersch grafts, and the wound closed posteriorly. The grafts were held with the usual cotton pledgets, dipped in aristole powder, the last of the packing being done through the opening in the concha.

This operation resembled a meato-mastoid operation with primary skin-graft.

Later a simple mastoidectomy was performed on the right ear. All the cells were removed. The antrum was entered, and the aditus exposed. The incus was movable, but was not nearly so free as it should be. It seemed somewhat deformed and fixed at the lower joint.

No trace of any cavity external to the position of the annulus on this side was discovered. A thick wall of bone between the mastoid cells and the glenoid fossa was reamed out, using the burr. The soft tissues of the fossa were accidently exposed. From this there was no disturbance in the temporo-mandibular articulation at any time. No annulus or drumhead was seen. The bone external to the tympanum was removed.

The lateral sinus and dura in the middle fossa were exposed and so primary skin-grafting was not attempted.

Just internal to the concave depression representing to us the position of the external auditory meatus was a little cartilage. This did not penetrate the bone, but fused with the tissues of the glenoid fossa.

An opening was made in the concha, the posterior wound closed, and the mastoid packed through the opening in the concha.

Nineteen days later, the original mastoid incision was opened throughout its extent again, and exuberant granulations were curetted, a Thiersch graft from the leg was placed in the wound, covering over smoothly the region of the aditus. The wound was closed posteriorly and cotton pledgets packed in through the meatus to hold the graft in position. The facial was all right after the patient regained consciousness.

The findings: Seven months after the operation on the left mastoid the hearing in the left ear was, whispered voice, forty feet. The right ear was not tested because of an acute middle otitis which was present at this time.

Frostbite. R. L. Sutton[8] thinks the fact that areas of skin that have been subjected to frostbite, and especially to repeated frostbite, are abnormally suspectible to cancerous involvement has not, however, been sufficiently emphasized. The parts commonly involved are the ears, particularly the helices, and the cheeks. The great frequency with which these areas are attacked can be appreciated only by a study of a considerable number of case histories. Of forty-six cases of seborrheic keratosis involving the ears and cheeks, examined during the twelve months elapsing Nov. 1, 1917, twenty-seven gave a history of frostbite. Of the twenty-seven, twenty-one presented one or more malignant growths on the affected areas. The majority of the seborrheic keratoses were of the keratoid type. Almost 90 per cent. of the carcinomas were of the basal cell variety. In three instances both the basal and squamous cell varieties were represented.

It appears that repeated exposure to very low temperatures tends also to reduce local resistance to the progress of the malignant growth, and thus becomes a factor in prognosis as well as in etiology.

The most important prophylactic measure is, of course, adequate protection of the parts commonly attacked. Should keratoses develop, the frequent application of an ointment containing small amounts (from 1 to 5 per cent.) of salicylic acid may be tried. In some instances, double this proportion of sulphur may also be advantageously added. In more advanced cases, suspiciously or frankly malignant, radium usually serves admirably, and possesses the great advantage of leaving the skin in a practically normal condition.

In attacking squamous cell growths of the ear, and especially if the associated lymph nodes are involved, radical excision is the method of choice.

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(8) Jour. Amer. Med. Ass'n., Dec. 29, 1917.

THE MIDDLE EAR.

Eight Cases of Suppurative Otitis Media Treated with Pure Phenol. These cases are reported by G. W. Walker.[1] The phenol is followed by the application of pure alcohol. The author recognizes that much has been done in the past, by ordinary methods of cleansing the tympanum through the external canal, or through the eustachian tube, and the use of weak solutions of antiseptics, but the use of pure phenol gives us the benefit of a most powerful antiseptic which does not cauterize anything except the epithelium. The epithelium is reproduced, and no permanent destruction has been done by the phenol. In radical mastoid, such as some of the cases would have demanded under other treatment, to be successful there must be more destruction of tissue than with phenol, and that followed by thicker cicatrices. When the oval and round windows can be left without thick cicatrices covering them, much more hearing can be retained than if they are covered deeply by scar. If this and all ordinary efforts will not succeed, of course a radical operation is indicated and should be done before brain abscess or sinus thrombosis of otitic origin has formed. "Of course, phenol pure has been used during the radical operation and why? To make sure, when some pyogenic surface might have been missed. If phenol can be gotten to the surface, without bone cutting, many cases can be treated which the patient would not have consented to have treated through a bone opening, and if it can be successfully done through a perforation, or a fistula, or an opening you may make with a knife in the membrane, where the perforation opening might not be just what is wanted, less destruction will have been done and the patient's reluctance can be easier overcome than a radical mastoid. The hearing is always made better, never diminished."

When pure carbolic acid is introduced into the middle ear, there is first a burning pain for about fifteen seconds; then the burning disappears, and does not reappear for a few minutes, and as the alcohol used within

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(1) Jour. Opth. and Oto-Laryngol., February, 1917.

two minutes checks the action of the carbolic acid, the after-burning is not severe.

Care must be exercised that any surplus of phenol, which may have been used, is not allowed to run down the neck, as it causes unnecessary pain. A large pledget of cotton, saturated with alcohol, held just under the external ear by an assistant, will catch any flow of the carbolic acid and prevent burning. Any carbolic acid that has gotten into the external canal can be neutralized at once, instead of waiting the two minutes for the effect in the middle ear, by simply mopping out the external canal with a pledget of cotton saturated in alcohol, which had been prepared beforehand for this emergency.

Vaccine Therapy in Suppurative Otitis Media. M. S. Fraser[2] has experimented extensively with autogenous vaccines in chronic suppurative otitis media. He believes that vaccine therapy, although more thoroughly understood than in past years, is still far from being absolutely scientific, for we have at present no available means of knowing, when preparing an autogenous vaccine for suppurative otitis media, whether or not the causative organism has been obtained. In an attempt to solve this question, we have prepared polyvalent antigens of the organisms enumerated above and, after collecting the blood from the patients afflicted with this disease, we have tried complement-fixation with these various antigens, but so far we have not succeeded. The hypothetical explanation is that either the organisms causing the suppuration do not produce free amboceptors in the blood, or our antigens were not sufficiently sensitive to give a complement fixation.

For some patients, at least, three or four vaccines have been prepared before the ears became dry, but the effort was worth while when such an annoying and dangerous condition as a chronic running ear could be relieved. If it is a fact that the bacteria causing a discharging ear do not produce antibodies, although they are toxin producers, it is advisable to use vaccine as an antibody stimulant. Once a dry ear is obtained it should remain dry, although one can not guarantee immunity,

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(2) Jour. Ophth., Otol. and Laryngol., April, 1917.

as a recurrent suppuration may mean exhaustion of the immune products or a new infection, for in many recurrent cases different organisms have been isolated.

Method of Administration: It might be preferable to administer suspensions of live bacteria, for in one case in which a streptococcus organism was isolated, by some error the vaccine was not sterilized and a live bacterial emulsion was administered subcutaneously. Following one injection of this the suppuration of thirty years' duration became dry, but the patient developed a severe abscess at the area of inoculation which necessitated incision and drainage.

Vaccines should be administered subcutaneously and never injected twice in the same area, for each area becomes a little laboratory where antibodies are formed and distributed throughout the body.

Summary: "1. It is advisable for the clinician to be both the otologist and bacteriologist, for he will often be tempted to discard or add to his vaccine certain organisms found in the culture, and unless close watch is kept on what organisms have already been administered, he may discard the most desirable and retain the most undesirable.

"2. Extreme caution should be used in collecting the infected material so that no saprophytes are included, as the latter often outgrow the primary causative organisms and vaccine produced from them is, of course, useless.

"3. Vaccine should be administered subcutaneously, for we have tried both the oral and aural methods without any response, while in all the dry ears that were obtained, the subcutaneous method was used. It is contended by some, however, that the intravenous method of administration is superior because it produces a general reaction. We believe that the same results can be obtained by the subcutaneous method, possibly using larger dosage, and at the same time avoiding the dangers that often accompany intravenous medication.

"4. Dosage: In adults the initial dose is approximately as follows: Staphylococci, *B. pyocyaneus,* pseudodiphtheria, 250,000,000; pneumococci, 100,000,000; streptococci, 25,000,000.

"These doses are rapidly increased until the following reactions are noted: A. Focal, B. Local, C. General.

"*A*. The focal reaction is characterized by a thinning and increase of the discharge from the ear, which, thereafter, lessens and finally ceases.

"*B*. Local reaction which occurs at the area of inoculation is characterized by redness, slight swelling, tenderness, induration, and a sensation of warmth in the part.

"*C*. The general reaction is characterized by slight headache, malaise, chill, possibly a slight elevation of temperature or nausea.

"5. Larger doses should probably be administered than previously thought, for I can recall several instances where vaccines failed, apparently due to insufficient dosage.

"6. In bilateral suppuration it is advisable to take cultures from both ears for the organism causing the discharge in each ear may be of a different variety.

"7. Vaccines should be used early before the discharge becomes chronic, if possible, for then the primary provocative organisms causing the discharge are still in the majority and can, therefore, be more readily obtained and cultured.

"8. Clinic stock vaccines that are left over from patients who have recovered should be utilized, for we have often found that some of these yield as good results as the autogenous vaccines, where diagnosis of the infection has been made.

"9. In our clinics we adhere strongly to vaccines, for we believe that thus far vaccines are superior to any other therapeutic measure at our disposal, and, therefore, recommend their use primarily and other treatments as adjuncts."

Ossiculectomy for Improvement of Catarrhal Deafness. This is discussed by A. J. Brady[3] who reports three cases. The patients were not operated upon primarily for improvement of the hearing, but for the relief of incessant and intolerable tinnitus after other methods had failed. In each of these cases, the appearance of the drum membrane and the position of the ossicles

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(3) Jour. Laryngol., Rhinol. and Otol., February, 1918.

led one to believe that the contraction of adhesive bands was drawing the ossicles inward, and exercising pressure on the intralabyrinthine fluid. The first patient was operated on over 20 years ago—a nun aged 25. She suffered from constant tinnitus in the left ear, which prevented sleep, and was breaking down her health. The hearing in this ear was also very dull, the right ear was affected to a less extent. The hearing was slightly dull, but tinnitus was distressing in left only, in which the membrana tympani was very opaque, thickened, and indrawn, and without light reflex. Various treatments, local and general, were without avail. As a last resource, the drum membrane, malleus and incus were excised. Relief of the tinnitus followed. Immediate improvement of hearing was not noted at the time, as the right ear was then relied upon, but when the left ear was tested some months later, a decided improvement was found in the hearing, both for watch and speech tests. The right ear became gradually deaf, and now (1917) is useless. The left ear, operated on over twenty years ago for the relief of tinnitus, is quite useful. She can hear conversation in this ear in ordinary tones, and she carries on her daily life without trouble—tinnitus is not complained of. The middle ear is completely epidermized, dry and clean.

The second patient was a man, hospital out-patient, with a distressing tinnitus in the left ear; the right was normal. He was unable to follow his occupation of seaman. Left membrana tympani, very much indrawn. Left ear, very dull hearing. No relief resulted from local and general treatment of usual sort. In the first instance the membrane was incised and tensor tympani divided with temporary relief. Complete relief of tinnitus resulted, hearing for tests was almost equal to good ear. The patient resumed his occupation and was not seen again, so this case is useless, as an example of permanent improvement.

In the third case, a very neurotic woman, a hospital out-patient, was a visitant of many clinics. Her complaint was distressing tinnitus aurium. The membrana tympani was greatly altered. There were old dry perforations, with much thickened remains of drum membranes. Remains of drum membrane and ossicles were excised in worse ear; no improvement. Here the local changes indicated a suitable case with hope of improvement.

The one clear case recorded, with well maintained and permanent improvement, shows that the experience of those who discussed Dr. Watson-William's paper is not universal, and that their pessimism, which has no hope for a permanent result in any case however well selected, is not justified.

Bacteriologic Findings in Suppurative Otitis Media in the New York Eye and Ear Infirmary. These findings are reported by H. A. Trotter.[4] The experiments were made especially to determine the *Streptococcus mucosus capsulatus* and its relation to otology. It has been the practice in that institution under Dr. Dixon, to examine smears from every case of suppurative middle-ear disease, acute or chronic, admitted to the wards for observation. They have abandoned the use of cultivations after having used them for a short time, as the germs present in the canal were found to be always mixed, and so much time was lost separating them. The mastoid pus in cases coming to operation was also examined and comparison showed that the predominating germ in the canal was found in the mastoid pus with sufficient frequency to make it a good rule to regard the predominating germ in the discharge from the middle-ear responsible for the mastoid involvement. As a rule they find that predominating germ shown in the smear from the canal pus, in pus from the middle ear, in practically pure culture in mastoid pus, in pus from brain abscess, spinal fluid in cases complicated by meningitis. Dr. Dixon during the past eleven years has made 5,496 examinations of aural pus. Of these 26.6 per cent. has been mixed infection, that is to say that a number of mixed germs were present, and it is not advisable to charge the infection to any particular germ. The majority of these were chronic cases, and where a radical operation was done the mastoid smear usually showed mixed infection. Streptococcus occurred as the predominating germ in 24.8 per cent.; pneumococcus 12.2 per

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(4) Jour. Ophthal. and Oto-Laryngol., January, 1917.

cent.; staphylococcus (aureas and albus) 7.4 per cent.; *Streptococcus mucosus capsulatus* 4.8 per cent.; spirillum of Vincent 1.8 per cent. The remaining 22.4 per cent. is represented by miscellaneous, negative, etc., among which are placed the *Bacillus pyocyaneous,* bacilli of diphtheria, tubercle bacillus, *B. coli communis,* Friedlander bacillus, etc.

The *Streptococcus mucosus capsulatus,* in the matter of relative virulence compared with these various microörganisms, stands first, also first in the destruction of bone; *Streptococcus pyogenes* is next, pneumococcus third, and staphylococcus fourth. In acute suppurative processes about the middle ear, the *Streptococcus mucosus capsulatus* is the most insidiously destructive the otologist is called upon to combat, and this can not be made emphatic enough. The *Streptococcus mucosus capsulatus* in a manner stands alone as being most virulent. When this microörganism is the infective germ the acute purulent middle-ear disease will tend to recover equally with the other forms of serious infection, provided it is seen early and proper drainage established.

A New Method of Medicating Eustachian Bougies. This is described by Lee M. Hurd.[5] Celluloid bougies are used, which are coated with silver nitrate, using gum acacia as a base.

Method of Preparation: In a narrow test tube, make a saturated solution of gum acacia in a water bath, then added the silver nitrate solution, making the solution of from 1 per cent. to 10 per cent. strength of silver as desired.

The bougie is dipped about one and one-half inches into this solution, and when the bougie has a uniform coating, it is placed to dry; then a second coating of the bougie is usually given. When dry, the gum acacia and silver coating looks and feels like varnish to the dry fingers.

The silvered bougies can be made up in quantities, and when kept dry, will last fairly well for a week or more.

The one disadvantage of using bougies several days old is, however, that the silver nitrate will gradually

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(5) Laryngoscope, December, 1917.

oxidize, so that the coated bougies, a week or more old, may have lost half of their silver nitrate percentage; they should be used not later than the second or third day after preparing them.

Method of Introduction: A plain gum elastic or celluloid bougie, of the proper size, is passed through the tube to make sure of the position of the catheter and the size of the bougie the tube will admit and also to dilate the tube, then the plain bougie is withdrawn, and the coated bougie can be readily passed as far as desired and remain there about two minutes to allow the moisture of the membrane to dissolve the gum and deposit the silver where desired, knowing that a definite percentage of the silver nitrate has been deposited.

When the bougie is withdrawn, the gum coating will be entirely gone or only a little stickiness will be felt.

The pathology of the tubal mucosa is practically the same as that of the nasal pharyngeal mucosa, acute congestion, chronic hyperplasia, chronic hypertrophy, etc.

The vast majority of tubal stenoses will readily yield to the use of the unmedicated bougie, but some cases of hyperplasia and hypertrophy relapse to their former condition, and the plain bougie fails; then the bougie varnished with gum acacia and silver nitrate will reduce the swelling.

Results: From 1 to 4 per cent. is usually strong enough to contract the membrane; if not, the strength can be increased up to 10 per cent.

The stronger percentages should be used cautiously if it is necessary to pass the coated bougie beyond the isthmus, as the weaker silver nitrate percentages produce no discomfort, but sometimes the stronger precentages will give annoyance and cause some pain, referred to the ear, similar to the discomfort produced in the nose by 10 per cent. silver nitrate.

Ultimate results, naturally, vary. Some tubes remain perfectly patent, while others relapse after a time, and require a repetition of the treatment.

Treatment of Simple Chronic Salpingitis. In simple chronic salpingitis M. F. Arbuckle[6] thinks inflation every second day, preferably with the catheter, is usually

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(6) Illinois Med. Jour., September, 1917.

sufficient. When it is not, the use of the bougie, in addition to catheterization, beginning with the smaller size and increasing the caliber as the tube opens up, at intervals of about every day for a few times, after which about once a week usually suffices.

The use of drugs has not been so successful in the tube as in other regions. Dionin in a 3 per cent. solution about every fourth or fifth day, and some of the silver preparations, probably do some good and should be used. They may be applied directly. This may keep the patient comfortable, but must be continued indefinitely.

In cases in which hypertrophy of the lower turbinal is present, with thickening along the lateral wall and around the os tuba, the treatment which the author has found to be satisfactory consists in the use of the galvano cautery, making three incisions on the posterior end of the turbinal, one of which extends back to the anterior lip of the os tuba. The cavernous tissue covering the tip of the turbinate is destroyed. The electrode is made of two naked copper wires with the usual plain platino-iridium tip, and covered by adhesive plaster along the shank after it has been shaped as desired. The tip is bent into the shape of a fish hook, and with the aid of a palate retractor and a large post-nasal mirror, which serves both as a mirror and as a tongue depressor, the operation is done in three steps. First, a line beginning about 1.00 to 1.25 cm. from the posterior end in the middle and extending backward with a downward curve, through the dependent part of the cavernous tissue, to the tip. From the same point a line is made back through the middle of the body to the posterior tip and extending along the lateral wall back to the anterior lip of the tube. The upper curved incision starts from the same point as the others, extending backward with an upward curve, and joins the second and first lines at the tip. The instrument is then removed, and if the cauterization is required for breathing purposes the operation is completed from the front by using a straight electrode, the tip of which can be shaped so as to remove much or little of the cavernous tissue of the turbinate, as is required in the judgment of the surgeon. The nose is then closed with cotton during the day for a few days and removed at night, without any other treatment. It requires from three to six months—frequently the latter—to begin to get results, but the results are usually satisfactory and permanent.

Translucency of Mastoid in Suppurative Otitis Media. According to W. G. Reeder[7] the translucency of the normal living tissue is truly remarkable; and conversely the disturbance of translucency in the presence of disease or death is equally striking. From the physical standpoint, translucency is a property dependent upon volume, density, and refractibility. Any or all of these factors may be altered sufficiently by cellular changes which accompany inflammation or death of a given tissue, to modify the normal translucency. Upon these physical phenomena is based the use of the transilluminator as a diagnostic agent.

In all cases of acute suppurative otitis media, the normal translucency of some portion of the mastoid is invariably disturbed. If hyperemia alone is present, the shadow is faint; but if infiltration takes place and gives way to pus formation and necrosis of bone, translucency becomes entirely abolished. In the presence of chronic suppurative otitis media, the mastoid is almost invariably quite opaque, because of the presence of eburnized bone.

It is evident, then, that the presence of a shadow over the mastoid or a sinus does not mean the presence of pus. It may mean the presence of dead bone; it may mean that the suppurative stage is past, and that complete resolution is not yet established; it may mean that organized new tissue is present; it may mean the presence of a new growth; and finally, it may mean, as before stated, an atypical anatomic condition.

It follows that the presence of the shadow over a sinus or the mastoid does not necessarily indicate that the case is surgical by any means. It may indicate surgery—yet any one of the above enumerated non-surgical conditions may be present. Most acute cases of mastoiditis or sinusitis which show a shadow go on to resolution without surgical intervention. Surgery based

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(7) Illinois Med. Jour., September, 1917.

upon the findings of the transilluminator alone is exploratory surgery.

"May disease be present and still no shadow be cast? It may be, but only in the event that too intense illumination has been used. The rule should be to use the least possible illumination, lest even disturbed translucency be overcome and pass unnoticed.

"What, then, is the value of the transilluminator? Used in conjunction with other signs and symptoms, it Alone, it gives but presumptive evidence of disease. becomes one of the strongest links in the chain of clinical evidence."

Mastoid and Sinus Involvement.

Indications for Operation in Acute Mastoiditis. H. G. Mundt[8] says:

1. Previous, local and general conditions. The first local condition—The advent of an acute mastoid involvement in a patient with an old purulent otorrhea is probably one of the most positive indications for immediate mastoid operation.

Nearly all mastoid disease is preceded by involvement of the middle ear proper; so in nearly every case one will get a history and find on examination involvement of the tympanum. This is not always the case, however, as anatomically there is such a thing as a closed mastoid (*i. e.*, no connection between antrum and middle ear or a connection so small that the congestion of the mucosa closes it), and nearly every aural surgeon has opened mastoids for patients who have practically normal (at least no acute involvement) drum membranes.

Again, given a patient who has had an acute otitis media which has not cleared up under a good course of local and general treatment, we have a patient for operation. Operation in such a case is a two-edged sword inasmuch as it will prevent the condition from becoming chronic when a much more extensive and serious operation might have to be performed, and also

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(8) Illinois Med. Jour., November, 1917.

saves the patient's life as well as preserves the integrity of the organ of hearing.

As is very generally recognized, early operation is indicated if the condition is a concomitant or a sequel of one of the acute exanthematous diseases; particularly is this true with scarlet fever and measles.

When we have good cause to think that the infection may be endogenous, little time should be wasted on any other line of treatment; especially is this true if there be little involvement of the middle ear proper.

Roentgen examination: The value of *x*-ray examination in acute mastoiditis Mundt does not consider nearly so important as in the chronic condition; however by comparison of the two mastoids much information may at times be gained, at least if the antrum and cells are full of pus the condition can be seen. Usually it is too early in the disease to see any necrosis; also anatomic variations from the normal may be seen.

It is the author's opinion that from a purely diagnostic point of view especially regarding arriving at a conclusion about the necessity of operation that the *x*-ray holds a very small place in acute mastoiditis.

Blood count: A leukocytosis is probably a constant concomitant of acute mastoiditis, if the patient has any resistance at all; however, a leukocytosis in itself is of no importance to us in this connection.

It is generally conceded that in an acute otitis media with a considerable leukocytosis (18,000-30,000) with a high percentage of polynuclears that it is probable that the blood-stream (*via* sinus) is being invaded and calls for immediate operation.

If bacteremia exists and all other points of possible infection have been excluded we would have a very positive indication for operation as it would probably foretell a sinus thrombosis.

Time element: This is hardly a satisfactory basis on which to arrive at a conclusion regarding operation, because more damage may be done in an hour in some cases than in days in others; it probably, however, gives us a fair working basis.

Given a case of uncomplicated acute mastoiditis in which there has been thorough general and local treatment for twenty-four hours, if there be no abatement in the symptoms but no increase in severity the physician should satisfy himself that drainage can not be improved and keep the patient under observation. On the other hand, if the symptoms have continued to increase in severity or something points particularly to an impending complication an immediate operation should be done.

In acute otitis media where the acute symptoms have abated but the discharge continues, under good treatment, the mastoid should be opened to preserve the integrity of the ear as well as possibly life itself.

Pain and tenderness: Pain would be a rather poor guide to advising operation in most cases, but given a case with perfectly free drainage through the external auditory *meatus* with no abatement of pain the mastoid should be opened.

Also, if after the discharge stops pain continues operation is indicated. Extensive tenderness of the mastoid which is not relieved by drainage, or continues after otorrhea ceases is an indication.

Little confidence can be put in tenderness as a guide to the severity of mastoid involvement (this also applies to pain, but not quite so much) as it may be very marked where the cortex is thin even though the involvement be very slight, while with a sclerosed mastoid or with a very thick cortex even with extensive involvement there may be little or no tenderness.

Deafness: This is a factor which is given very little attention, however, Charles J. Heath lays much stress upon it. He argues that the integrity of the ear as the organ of hearing is all-important and that when the hearing becomes markedly involved there is great danger that it will not clear up unless the infection is taken care of at once. Also, he considers simple opening of the mastoid so simple a procedure and recovery is so rapid that he lays much stress on this point as calling for operation.

Examination of the ear and mastoid region: On inspection of the drum membrane if one is satisfied that there is very free drainage (which can not be improved) with no abatement, or with an increase in signs and symptoms, the operation should be done.

Bulging or sagging of the posterior superior wall of the external auditory meatus in close proximity to the membrana tympani, which is due to involvement of the cells below and anterior to the mastoid antrum (cells of Kirchner) is universally conceded to demonstrate the necessity of opening the mastoid.

Redness and swelling over the mastoid region is a rather frequent finding, especially is this true in children, the presence of either in an adult probably calls for an operation; in a child it may subside after drainage but should cause one to be on his guard. Once a mastoid in an adult has been sufficiently involved to cause these symptoms it is very doubtful if complete resolution can ever take place, and if this be true and we are not ultraconservative we will probably advise operation.

The development of a subperiosteal abscess which is rather frequent in children, especially in infants should bespeak the need of opening the mastoid. Occasionally a big subperiosteal abscess will drain out through the middle ear and clear up but the danger is too great to take a chance.

Extension of infection (pus) into the glands of the neck or drainage through the tip of the mastoid under the sterno-mastoid muscle (Bezold process) demands operation.

Aural discharge: It must be remembered that we may have all of the symptoms of mastoiditis with no involvement of the middle ear proper, when no discharge will be found. In this case the infection is probably blood-borne or else there may have been advent of infection from the tympanum and it caused enough swelling to cut off the connection. In other words, it may have been a closed mastoid in which there was no otorrhea or other involvement of the middle ear; this type of mastoid should be opened when diagnosed.

Another exceedingly important factor which must always be kept in mind is the presence of an enormous discharge (practically runs out of the ear); more than can be accounted for as coming from the middle ear and mastoid. This is, in Mundt's opinion, one of the most positive indications for operation.

If an ear continues to discharge (under good treatment) for weeks after an acute otitis media, it demonstrates necrosis beyond the sphere of treatment and demands operation.

Bacteriologically we have a very valuable basis for opinion. The presence of streptococci, especially capsulated, should call for the most careful watching as their presence seems to forbode complications and one should be doubly quick to advise operation if the case does not progress in a very kindly way.

General symptoms: In a patient in whom the general prostration seems out of all proportion to the severity of the local disease operation should at least be very seriously considered.

A sudden rise of temperature, especially where drainage can not be improved, demands operation. The symptoms which usually bespeak some intracranial complication and demand most careful attention are destroyed audition, vertigo, nystagmus, facial paralysis, convulsions, severe rigors, or sharp rise or fall of temperature.

Routine Employment of Lumbar Puncture in all Mastoid Operations for Acute Infective Aural Disease. This is advocated by Archer Ryland.[9] The reasons given are:

1. Because it is highly desirable to know (previous to any operation for aural disease which falls into that class of case under consideration) whether or not the spinal fluid is turbid. An aural diagnosis which has taken into account the condition of the lumbar fluid is of higher value than one that has not done so. The procedure is dangerless, and, in the great majority of cases, it is quickly and easily performed. In all cases in which it has been decided to operate, it is suggested that a specimen of the spinal fluid be obtained as soon as the general anesthesia is complete, and before the operation begins.

2. Because, in certain instances, the tissue reactions fail, and the middle-ear infection proceeds with great rapidity to an intracranial and meningeal infection. "It

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(9) Jour. Laryngol., Rhinol. and Otol., April, 1917.

is extremely difficult, if not impossible, to know whether or not a given case of acute mastoid disease will be a case of this type. The evidence that we can get from an actual operation does not answer this question. When an operation exposes the diseased area, it is not uncommon to find an almost complete absence of Nature's barriers or rallying zones (in the form of extradural abscess, suppuration of mastoid antrum and cells, or lateral sinus-tissue changes) across the path of an advancing infection. As a matter of observed fact, a diffuse, or perhaps focal inflammation, of mastoid cells, with or without a mere reddening of the cell linings, may be found to be the whole visible extent of the local tissue reactions. Cases of this nature occur with some frequency, and they are treacherous. They are, no doubt, of far less common occurrence than the type of case which must be ranged at the extreme opposite end of the scale, where local tissue changes and their well-known manifestations are vigorous and prompt. If we know, before beginning to operate, that the fluid is turbid; if we know from actual operation evidence that tissue reaction has failed, has been defeated, or has never been initiated; then it becomes clear that we are dealing with a case of grave nature. It is better to seek out and possess ourselves of this knowledge at the time of the operation, when possibly prompt translabyrinthine drainage might be successful, than to be suddenly confronted and surprised with this knowledge some hours or some days afterward, when a translabyrinthine operation may be too late to be effective."

It seems to Ryland that if we do not obey the earliest sure indication for drainage through the labyrinthine route, it is of little use to wait and obey a later one.

When the abdominal surgeon opens the abdomen in order to deal with a presumed localized affection, he will know, in most of his cases during the course of the operation, whether or not he has to deal, after all, with a diffuse peritoneal infection. The operation which the aural surgeon carries out gives him no corresponding knowledge with regard to the state of the meninges.

3. Because it is probable that a certain proportion of these cases which begin to manifest signs of menin-

geal infection for hours, or even days, before an operation was performed.

4. Because lumbar puncture as a routine procedure would do much to establish the frequency of occurrence, and to inform us as to the type of case in which we are to expect occurrence of the condition known as meningitis serosa. Also it might result in a more clear and complete elucidation of the condition itself.

5. Because the procedure would afford a safeguard of some value to the reputation of the operator.

Definition of Radical Mastoid Operation. A radical mastoid operation is defined by C. B. Welton[1] as an attempt to remove all diseased bone and to provide absolutely free drainage of all infected recesses of the mastoid cells, antrum, aditus, attic and middle ear, by way of the external auditory meatus.

He gives the following indications: The most frequent condition which brings these patients to the aural surgeon and from which they seek relief, is the presence of a chronic suppuration from the middle ear. The largest percentage of cases run between twenty and thirty years, due to the wish to be relieved of an otorrhea for esthetic reasons only, with little or no realization of the dangers it might bring on. The author's twenty-six cases ranged from 16 to 32 years in age, eleven being under 30. There were two patients on whom a double mastoid operation was performed.

These patients usually at the suggestion of the attending physician, seek relief for some more or less obscure, though possibly serious symptoms, such as vertigo, severe head pains or a general lassitude, which do not yield to other treatment. Chronic aural suppurations produce a low-grade toxemia and it is often difficult to determine just what is the matter with the patient thus affected. A chronic purulent otorrhea is a positive menace in some cases to the life of the patient, but in other cases the danger of intracranial extension is exceedingly remote. The responsibility of the surgeon in his advice to a patient in a case of a discharging ear, is a matter of fine distinction. It is his duty, in patients with signs and symptoms demanding it, to state positively that the

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(1) Illinois Med. Jour., April, 1917.

patient's safety requires surgical intervention, but it is, in other cases, no less his duty to state with equal frankness his belief that operation is not required and without emphasis upon remote possibilities which the patient is not likely to experience.

Politzer divides the indications for operation into two classes—subjective and objective.

The subjective are the "persistence of pain in the ear or over the mastoid process. Permanent or intermittent attacks of vertigo, due to erosion of the external semi-circular canal. Marked cerebral disturbance."

The objective symptoms are: "Where a fetid suppuration has existed a year or longer and local treatment to the middle ear for a period of three months has failed to cure."

In a case such as the above, where local treatment has not brought about a cure, the presence of carious bone is assumed, as local treatment to the middle ear means and includes removal of granulations or polypi from the middle ear. After such removal, if the granulations quickly recur and if the discharge continues, carious bone is surely present. To these Welton would add the following indications:

Frequently recurring middle-ear suppuration with preceding malaise, slight or severe head-aches, rise of temperature and tenderness over mastoid. In such a case it may be assumed that the antrum and mastoid cells are the seat of a subacute suppurative process, extension of the bone disease taking place with each succeeding attack.

Another indication for operation in a chronic otorrhea is where the disease is not limited to the tympanum and where operation is prophylactic against fatal results coming without signs of pus retention or visible inflammation of mastoid.

Operation is also indicated in a patient with chronic otorrhea in whom the discharge lessens or stops altogether and pain and tenderness over the mastoid bone follow with relief from these symptoms upon the resumption of the otorrhea.

Chronic suppurative mastoiditis, the result of chronic suppuration of the middle ear, is an operative indication. Such a condition may continue a long time without necrosis of either the medial or the lateral plate of the mastoid antrum. In every case of chronic suppuration in the drum cavity there is a concomitant suppuration in the antrum and sometimes also in the mastoid cells. Chronic suppuration of the mastoid bone may now take one of two courses. Pain in the mastoid with headache and fever without any external mastoid symptoms may indicate an irruption of pus either into the lateral sinus and posterior cranial fossa or forward into the middle cranial fossa, or pain in the mastoid with fever may be followed by tenderness and swelling of the outer mastoid surface and spontaneous opening of the cortex, with escape of pus beneath the dense cutaneous tissues of the mastoid region.

An onset of acute mastoiditis, during the course of a tympanic suppuration, is always an indication for the performance of a radical mastoid operation.

Fistula of mastoid bone, either through the posterior wall of the bony meatus or through the outer cortex, is another indication. In a series of cases of subperiosteal abscess Mygind found that a cortical perforation resulted from an acute mastoid inflammation complicating chronic suppurative otitis media and that in 75 per cent. of these the vault and mastoid cells were filled with cholesteatoma. This observation makes a positive indication for the radical operation in the presence of fistula.

The danger of suppurative labyrinthitis, which has been shown to be due to disintegration or absorption by cholesteatoma upon the bony capsule of the labyrinth also makes an imperative indication for the radical operation with this condition present. A patient in whom cholesteatoma is demonstrated is constantly exposed to the danger of an intracranial complication.

In old healed suppurative cases, sudden marked labyrinthine vertigo is due to spread of inflammation to the labyrinth or pressure from accumulation there. These symptoms may call for the radical operation, but no patient should be subjected to the radical operation until his labyrinth has been carefully tested for evidence of suppurative labyrinth, without taking the greatest risk with the life of the patient, unless at the same time the labyrinth itself is opened and drained.

Where the *x*-ray shows necrosis, then the radical mastoid operation is indicated. In a large percentage of these chronic cases the middle fossa is found unusually low, the sinus in some instances being so far forward as to occupy the greater part of the antrum, and the *x*-ray will, in these cases, determine these points.

In bone disease—either a sclerosing or a rarefying osteitis—the operation may be indicated, where such condition produces periodic attacks of mastoid pain after all signs of active trouble in the ear have ceased. Seven of the cases showed rarefying type of bone disease.

Another condition which would require operation is a narrowing or complete stricture of the external auditory canal which would lead to the retention of pus.

Other conditions which would necessitate operative interference would be:

Paralysis of the facial nerve. (This would show extensive bone disease and almost always denotes the presence of cholesteatoma and also occurs in tuberculosis.)

Tuberculosis occurring in a chronic suppuration from the ear is another indication. (Pulmonary tuberculosis being a contraindication.)

Any intracranial or sinus involvement or the presence of an oncoming general septicemia would be an indication for the radical mastoid operation; also presence of neuro-retinitis or choked disc occurring in a patient with a chronic suppuration of the ear.

Life insurance companies refuse to accept persons with chronic otorrhea. Patients with such a condition should submit to a radical mastoid operation, not only for the preservation of life, but to enable the individual to occupy a better position in the world.

In children the radical operation is indicated only when there is necrosis in both middle ear and mastoid cells.

Children under 4 years should be treated expectantly.

Children from 5 up, with two years' suppuration, in which there is increasing deafness, may be operated on.

Recurrence of Suppuration Following the So-Called Radical Mastoid Operation. This does not, according to C. H. Long,[2] indicate that the Tille operation is a failure.

Every case should be subsequently inspected, annually or semi-annually by the operating physician in preference, or by some specialist conversant with such ear work. Any recurrence of the suppuration can thus receive prompt and competent attention and all further trouble prevented.

The Various Complications of Mastoiditis. These are listed and partially discussed by J. M. Smith.[3] With a purulent otitis media and mastoiditis present, it is possible to have the infection extend or to be carried by the blood to almost any part of the body, but as a rule the resulting complication is usually one or more of the following conditions—meningitis, erysipelas, pneumonia, thrombosis of the lateral sinus, and an adenitis, especially of the glands in the neck of children and, less frequently, brain abscess and labyrinthitis—the two last-named conditions occurring, in the majority of cases, in the presence of a chronic infection.

Nature's warning of an extension of the infection is practically always a chill, accompanied by a sudden rise in temperature, and it is just at this point that it is most difficult to determine the point of election of the invading organism, since we may have a beginning erysipelas and at the time of the initial chill and rise in temperature the wound shows none of the characteristic symptoms of redness, burning, swelling, etc., or a beginning pneumonia, with the physical signs still masked, an incipient meningitis with a negative Kernig sign, no stiffness of the neck, etc.

At this stage, the best key to the situation is a white blood count, for the following reasons: Given a total white count of 30,000 or more cells to the cubic millimeter, we immediately suspect a pneumonia; a total count of around 20,000, a meningitis or erysipelas, the count being a little higher in meningitis than erysipelas; a count between 10,000 and 12,000 a thrombosis of the

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(2) Illinois Med. Jour., September, 1917.
(3) Med. Record, Dec. 8, 1917.

lateral sinus; a true leukopenia possibly malaria, typhoid, or tuberculosis.

Not enough importance is attached to the diagnostic value of a total white cell count in cases of infection of the lateral sinus. In quite a number of such cases at the New York Eye and Ear Infirmary, the count has been around 12,000 where there was no other complication present. The value of this procedure is inclined to be underestimated by many, because a 10,000 cell count is so close to normal (6,000 to 8,000); that is true in cases in which the temperature is normal, but a different proposition entirely when we have a temperature reaching 106° F.

The one condition which stimulates the temperature curve of thrombosis of the lateral sinus the most is that of a malarial infection, and in that case we get a leukopenia, and it is undoubtedly true that there are too many general practitioners, as well as otologists treating cases of infection of the lateral sinus for malaria and typhoid fever.

Suspecting a thrombosis of the lateral sinus, we immediately order a blood culture, remembering that we may get a negative culture due to the fact that the sinus is completely blocked by the clot. This usually occurs in cases of long standing. Another rather important point is the fact that the patient's mind remains clear in spite of the high temperature, in contradistinction to what occurs in meningitis, where the patient usually becomes delirious in from twenty-four to forty-eight hours. Also, there is usually an absence of pain or headache.

Suspecting an erysipelas, an examination of the wound shows, in a very few hours, the tense, fiery-red swelling which, together with the burning pain and progressive line of demarcation, leaves us in no doubt as to the diagnosis.

If we suspect a pneumonia, in a very short time the increased respiration, cough, bloody sputum, pain in the chest, together with the physical signs, make the condition certain.

A meningitis being suspected, a lumbar puncture should immediately be done, taking care that no blood is obtained in the specimen, so that an accurate cell count may be had, and with a cell count of five or six cells per cubic millimeter, a reduction of Fehling's solution, together with a negative globulin reaction, we can be pretty sure there is no involvement of the meninges at this time, especially in the absence of stiffness of the neck, a negative Kernig sign, and no delirium.

In case we have a meningitis we can be sure when it becomes diffuse that the afternoon of the second or third day will show stiffness of the neck, marked headache, and delirium, quickly followed by death. It is important that the Kernig sign be tried, because it will be present, to some extent, before the above symptoms are so marked.

It is well known that when we have a true abscess of the brain it may be present for several years, and so well walled off by Nature that the patient has practically no symptoms. The pulse and temperature stay around normal or subnormal, and when the temperature and pulse go up to any marked degree, then we can be pretty sure that the abscess is beginning to involve the meninges either by rupturing into the ventricles or by breaking through Nature's protecting wall at some other point.

A lumbar puncture in a true brain abscess will usually be negative, and when it does show positive results means brain abscess plus meningitis.

The question of labyrinthitis, while rather a rare complication, is a very important one. This is especially true in acute cases of long standing, where the infection has involved the perilabyrinthian tissues, causing nausea, vomiting, vertigo, nystagmus, headache, in fact practically all the symptoms of a purulent labyrinthitis, but an examination shows an active labyrinth, while with a purulent labyrinthitis the labyrinth will be dead.

In the perilabyrinthitis the prognosis is very good and a complete exenteration of the mastoid cells results in an early recovery, while a purulent labyrinthitis would require a labyrinth operation and would necessarily offer a more grave prognosis.

Again, we must not lose sight of the fact that a sudden rise in the temperature may be due to an involvement in the other ear, especially in very young children, and we must always eliminate this possibility.

The Blood-Clot Method in Mastoid Operation. This is described by F. D. Boyd.[4] The preparation of the patient and the operative field is the same as in the old method; the drum membrane, though showing a fairly large perforation, should be re-incised in order to provide the freest possible drainage from the tympanum. The post-auricular incision through the soft parts differs from that used in the old operation. It should be made a little farther behind the post-auricular attachment; it should commence at the tip and be carried upward, following a curved linear direction, parallel with and one-half inch behind the attachment of the auricle. Especial care should be taken not to injure the periosteum. Unless it be absolutely called for, the supplementary horizontal or "T" incision should be omitted, and the primary incision should be made one-fourth inch farther back from the auricular attachment. This additional space is available for the bone operation.

When the bone operation is completed, the cavity is washed out with a normal salt solution, dried, and then allowed to fill with blood. The anterior and posterior flaps are then brought together, the edges carefully approximated, and held together by Mechelle's skin clips (this, however, is a matter of preference, as some might prefer interrupted sutures of cat or silkworm gut). In this way the wound is entirely closed except at the lower end, which is left open; the lower portion should be left free for serous outflow. Over this a large protective dressing of sterile gauze is applied.

The post-operative treatment consists chiefly of daily changes of the protective dressing. One should be very careful not to infect these wounds. At the same time, a wound treated in this way is not half so liable to become infected. The clips are removed on the fourth day and this, in Boyd's opinion, has a great advantage over the sutures, as the sutures must be left *in situ* for from five to seven days. In favorable cases the wound so far as future care is required, has every appearance of and is healed in from four to eight days.

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(4) Jour. Opth. and Oto-Laryngol., March, 1917.

The facts which its advocates urge in favor of the adoption of this operation may be stated as follows:

First: The blood-clot itself has been proved to possess a decided bactericidal property, and this is depended upon to counteract any germs left in the wound, and to prevent any infection.

Second: In surgical diseases and injuries of the long bones, the use of the blood-clot has provided a reticulum or scaffolding upon which new tissues have seized; the clot then becomes quickly organized and finally converted into permanent osseous tissue. The cavity resulting from mastoid operation is regarded as providing a favorable field for this conservative process.

Third: In actual experience a large proportion of cases operated upon by this method have been successful in Boyd's hands.

Fourth: The blood-clot operation saves much pain and discomfort; and, in the case of wage-earners, the loss of time from work is only a small fraction as compared with the post-operative period of the old method.

As to the danger of the closed wound in case infection should occur, the remaining focus of infection would involve the blood-clot itself, sooner than normal living tissue. The natural tendency when a sufficient amount of septic material has been left in the wound to interfere with natural healing is toward destruction of the clot, consequently breaking down of the wound margins. Hence, the dangers to life are purely hypothetical.

Should the blood-clot break down during the period of its protective viability, it results in the formation of foundation granulations, act as a basis for subsequent repair, with speedier and more satisfactory healing of the wound.

The blood-clot method has its disadvantages as well as its advantages, in that the vault, should it become infected, would have to be drained backward through the aditus into the space formerly constituting the antrum. In blood-clot operations we are deprived of the use of the aditus as a means of draining the vault.

Bacteria and their virulency in a mastoid are always an unknown quantity, varying in each case, therefore it is essential to completely exenterate all the cells of the mastoid before the blood-clot is attempted, for fear that there are some hidden bacteria that might overcome the resistance of the tissue, in which instance the blood-clot offers the best culture media for a prolific growth. When a mastoid comes to a secondary operation, the operator usually finds some infected cells, which were not removed at the original operation. The zygomatic cells and behind the lateral sinus are those most likely to be overlooked.

Lateral Sinus Thrombosis Without Typical Symptoms. Five cases are reported by A. S. Kaufman.[5] The lateral sinus is exposed to infection through numerous avenues, and it is truly remarkable that we are not confronted with this condition more frequently, particularly when we consider the amount of procrastination that is practiced in mastoid surgery under the guise of conservatism. Most authorities teach that the etiology of sigmoid sinus phlebitis is usually a chronic otorrhea or mastoiditis, but it is interesting to note that in four of the five cases here reported the condition has been acute. It is practically impossible to say in what proportion of mastoid cases this complication occurs, as it varies greatly in the experience of different otologists, depending, of course, on the conservatism of the individual and upon the length of time that the general practitioner will treat suppurative ear conditions before calling in a consultant.

Considering the routes of infection in anatomical sequence, there is, first, the direct infection of the jugular bulb. This condition may complicate an acute suppurative otitis media without a true septic involvement of the mastoid process; it occurs mostly in children, due to the fact that the floor of the tympanum may be wanting or is in the process of ossification. Next, we have the involvement of the veins emptying into the sinus, principally the emissary vein, which become blocked with thrombi, and the infection extends to the sinus, and there, in turn, forms another thrombus, first mural and later complete. Third, and most common, comes the direct phlebitis following a necrosis of the bony structure of the mastoid. Last, we have the involve-

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(5) New York Med. Jour., Dec. 29, 1917.

ment of the sinus from an acute suppurative otitis media in the atypical mastoid, *i. e.*, the mastoid which is devoid of cells and is composed only of the cortex, and directly contains the sigmoid portion of the lateral sinus.

There is nothing more easy to diagnose than a typical case of septic sinus thrombosis. We have the history of a suppurative otitis media, acute or chronic; the patient notices a dull, heavy sensation, although not a true headache, on the affected side of the head for a few days; then he is suddenly taken with a severe chill lasting sometimes from twenty to thirty minutes, and with it a sharp rise of temperature, pulse and respiration increasing in proportion, then a profuse sweat and a descent of the temperature to normal. There is then a period of from a few hours to several days without symptoms, and there is a repetition of the demonstration of sepsis. If the condition goes untreated, these symptoms become more frequent until there is a persistently high temperature and all of the other indications of severe general toxemia.

It is well to consider the pathology of this symptomatology. As the clot becomes infected, a small piece separates from the main portion and enters the blood-stream, producing the evidence of septic infection, which is shortly overcome by the phagocytic action of the blood. This is then repeated until the infection in the blood-stream is overwhelming, or until a severe septic process is established in one or more viscera. On the other hand, the upper part of the clot may break down, and the lower part, particularly that in the jugular, remains firm for a while; here, then, we have a condition which is liable to do just as much damage, but with a great deal less warning. In this latter condition, no definite symptoms can be mentioned that would enable us to make a diagnosis, and most of these cases are discovered only during the performance of a mastoid operation done for the usual reasons. The following should, however, make us suspicious, and at least urge an early operation and an examination of the sinus: dull, heavy sensation in the head, particularly if on the affected side; persistent high, or moderately high temperature; fullness of the retinal vessels and, added to this, the bleeding bone found in the mastoid. To this might be added also a positive blood culture, but it is not present in this class of case often enough to be of service.

Great difference exists in the teaching of various authorities as to the time that an ear, free from urgent symptoms, should be allowed to discharge, and, as conditions vary, we probably never will be able to fix the limit in days or weeks, but must be guided by signs and symptoms.

As a rule, in sigmoid sinusitis the vein will be found actually exposed or covered with necrotic bone which demands removal, but it is not necessary to uncover the sinus for inspection in every mastoid operation if, for instance, the bony wall is healthy and shows a normal blue color under it, or if the patient has shown no suspicious symptoms. However, this procedure should be followed in every case in which there has been a persistent moderately high temperature before operation with no other conditions demonstrable as a probable cause together with a distention of the retinal vessels, and in every case in which there is unusually free and uncontrollable bleeding from the bone. Of course, the hemorrhagic type of mastoiditis may be somewhat difficult to distinguish from the bleeding due to the thrombosis of the sinus and the resulting engorgement of the bone. It may be of assistance, however, to remember that in the hemorrhagic mastoid the discharge from the ear is usually sanguineous, but in sinus thrombosis the bleeding occurs only after the operative work is begun on the bone.

The author concludes:

Procrastination in treating otorrheas that do not yield within a seasonable time to non-surgical measures or show signs of continued mastoid involvement is dangerous to the patient.

There is no harm in uncovering a sinus for inspection, and it should be done when the patient has had a moderately high continuous temperature, where there is a fullness of the retinal vessels, persistent headache, or where, at operation, there is more than the usual amount of hemorrhage from the bone.

It is safer to ligate the jugular vein prior to turning out the clot in the sinus in all cases, the only contraindication being some urgent condition which demands shortening the time of operation and the avoidance of shock as much as possible.

Where there are distinct symptoms of sinus thrombosis, the time for operation is after the first chill. With early operation the prognosis in all cases of thrombosis is very favorable.

THE INTERNAL EAR.

Recent Work on the Internal Ear. This has a very practical value to otologist, ophthalmologist, general practitioner, syphilologist, neurologist and surgeon.

A study of the relation of the ear to the central nervous system, says I. H. Jones,[1] not only opens a new field for investigation in physiology, but also furnishes information of diagnostic value in the every-day examination of patients. Although it is essentially and entirely an ear study, and is useful in the analysis of ear conditions, yet recent investigations have shown it to be of value in medical and surgical diagnosis.

It is now recognized that the internal ear, instead of being one organ, consists of two organs of different functions—the cochlea, which is the organ of hearing, and the labyrinth, which is the organ of equilibration. It seems remarkable that whereas the cochlea has long been recognized as the organ of hearing, the static portion of the ear, consisting of the utricle, saccule and three semicircular canals, has been through all the years a *terra incognita*. It is only in the past few years that the function of the static labyrinth has been carefully studied; pre-eminently by the Vienna group of otologists, to whom we are indebted for the new methods of testing the internal ear. Robert Barany has recently received the Nobel prize for this work, and he is to be regarded as the pioneer in the clinical application of the study of the ear and the central nervous system.

The semicircular canals may be stimulated by revolving a person in a turning-chair, or by douching the

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(1) Jour. Amer. Med. Ass'n., March 17, 1917.

ears with either cold or hot water, or by applying the galvanic current to the ear. According to Jones' experience, the turning and douching are much more useful than the electrical test. The galvanic current stimulates equally all portions of the internal ear and, in fact, the eighth nerve itself. As it is of greatest importance to analyze the function of the canals separately, Jones considers in this paper only the tests by turning and douching. The essential feature in the physiology of these tests is that the endolymph within the particular canal or canals stimulated is set in motion on the one hand mechanically by the turning, and on the other hand thermically by the douching. When a person is turned to the right, the endolymph catches up to the movement of the body; and when the turning-chair is stopped, the endolymph continues to move to the right by its own momentum. The physiology of the caloric test may be illustrated by the "thermosyphon" system of some of the popular automobiles. They have no water-pump to force a circulation through the radiator; the engine heats the water, decreasing its specific gravity and causing it to move upward and forward into the radiator, where it is cooled, drops to the bottom of the radiator, and continues downward and backward into the engine, thus completing the circuit. Similarly chilling the outer portion of a semicircular canal increases the density of the endolymph at this point and produces a circulation downward.

Such ear stimulation produces certain definite phenomena in normal persons—a rhythmic jerking of the eyes known as nystagmus and a subjective sensation of turning which may be termed a systematized vertigo. The eyes are always drawn in the direction of the endolymph movement and are then quickly jerked back in the opposite direction by impulses from the cerebrum. The subjective sensation of vertigo is always in a direction opposite to the endolymph movement. According to Jones' belief, there are only two reactions produced by ear stimulation—vertigo and nystagmus; it is because of this vertigo that the person falls in a definite direction, and also, when he attempts to find with his finger an object he has previously touched, he is unable to find it but past-points to the right or left, above or below, depending on the direction and plane of his sensation of vertigo.

It is evident that if stimulation of the ear causes a movement of the eyes, there must be a definite nerve pathway from the ear to the cerebral cortex. The special object of our work has been the attempt to determine the pathways through the brain from the ear. On the basis of over 350 pathologic cases, including a considerable number of operations and necropsies, the author has come to certain conclusions as to the course of the fibers from the ear through the brain-stem, cerebellum and cerebrum. In brief, these conclusions are as follows:

The fibers from the horizontal semicircular canals pass through the eighth nerve to the brain-stem, and enter Deiters' nucleus in the medulla oblongata. At this nucleus the fibers divide, going on the one hand to the posterior longitudinal bundle, through which they are connected with the various eye muscle nuclei, to be distributed through the third, fourth and sixth nerves to the eye muscles themselves. It is this pathway that is responsible for the eye movement. The other pathway goes from Deiters' nucleus through the inferior cerebellar peduncle to the cerebellar nuclei of the same side, from which it proceeds through the right superior cerebellar peduncle to the decussation of the two superior cerebellar peduncles in the base of the cerebral crura; from this point there are two pathways to the cerebral cortex of both sides, but the main pathway goes to the cortex of the opposite side. The cortical centers that receive these fibers are postulated by Mills to be in the posterior portion of the second temporal convolutions adjacent to the cortical areas for hearing. It is this pathway from the horizontal canal to the cerebral cortex, passing through the cerebellum, that is responsible for the production of vertigo or ear stimulation. The fibers from the vertical semicircular canals have a different pathway after entering the brain-stem, ascending in the pons to fibers divide, on the one hand going to the posterior longitudinal bundle, to be distributed to the eye muscles; on the other hand the fibers enter the cerebellar nuclei through the middle cerbellar peduncle, from which point their pathway is the same as that of the fibers from the horizontal canal. In a nutshell, by the vestibular apparatus is meant the static portions of the internal ears, and the pathways from the ears through the brain-stem, cerebellum and cerebrum.

The importance of these tests in diagnosis is:

1. Value to the general practitioner: The general practitioner is constantly confronted with cases of "vertigo." It is surely not overstating the fact to say that at best he can only guess as to its significance. In the light of these new tests, vertigo should no longer be regarded as a vague and general symptom. We should never speak of gastric vertigo, kidney vertigo, cardiovascular vertigo, idiopathic vertigo, or any other generalization which in its ultimate analysis means nothing. Vertigo is definitely a disturbance of the equilibratory apparatus. These tests give us the means of analyzing this apparatus. All conscious sensations are cerebral; headache from whatever cause is a disturbance in the brain. Similarly vertigo is due to an irritation, impairment or destruction of some portion or portions of the ear or its associated pathways. Therefore, just as we examine the urine in suspected cases of nephritis or diabetes, or as we have a Wassermann test made in suspected cases of syphilis, just so these ear tests enable us to analyze the apparatus responsible for dizziness. Instead of guessing, we then know the reason for the vertigo. We do not hesitate to say that it is very rare that a "dizzy" case remains obscure after these ear tests, and in most instances the diagnosis becomes clear and simple.

After these tests are made we are able to say, for example, that the patient is dizzy because of a toxic impairment of his labyrinth, a labyrinthitis, an organic lesion in some part of the vestibular tract such as is produced, for example, by a brain tumor, internal hydrocephalus or multiple sclerosis; or, in the presence of normal reactions, we can state with assurance that the vertigo is purely functional.

2. Value to the otologist: It is surprising how much information can be obtained by these tests in the ordi-

nary every-day study of an ear case. Briefly, from the ear standpoint alone, we have by means of the turning and douching tests produced nystagmus, vertigo, past-pointing and falling, the clean-cut quantitative objective evidence of the function of each part of the static portion of the labyrinth and eighth nerve. A patient complains of deafness; the question arises, is it a middle-ear or an internal-ear condition? These hard and fast reactions give positive data of the function of the internal ear; then a positive opinion can be given with less reservation. Institutions for the deaf and dumb obviously should have a turning-chair; in these poor unfortunates the functional tests of hearing are so often unsatisfactory that we never feel after making the hearing tests that we are sure the labyrinth is completely destroyed. It is just here that the new tests are valuable; they either do or do not give reactions. The answer is "yes" or "no." In routine examination, it is of course not necessary to conduct all the tests; merely by turning the patient and obtaining twenty-six seconds of after-turning nystagmus, we at once can conclude that both static labyrinths are normal. Very often, however, the nystagmus will be subnormal, and immediately we have a hint as to the necessity for further study.

Jones has no hesitancy in suggesting that if the otologist in his routine work will make such a simple test, he will be surprised to find that in many instances an entirely new light is thrown on the condition of his patient.

Value of the Galvanic Method of Testing the Functions of the Inner Ear and Eighth Nerve. This subject is discussed by G. W. Mackenzie.[2]

In making the galvanic test certain essentials are required: (*a*) A suitable electrical apparatus with clean contact points; (*b*) even more important is an accurate milliamperemeter; (*c*) a reversing switch under the control of (*d*), a capable assistant who controls the polarity, the amount of current, and observes the milliamperemeter; (*e*) two electrodes, one about two inches square and flat, and the other a small ball electrode

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(2) Jour. Otol., Rhinol. and Laryngol., September, 1917.

(about a quarter inch in diameter, although one-half inch will work satisfactorily). Both electrodes should be wrapped snugly in moist cotton or gauze.

Before starting the test, examination should be made to see if the patient has any spontaneous nystagmus. Its presence or absence should be noted on the patient's record. After soaking the electrodes and the parts to which they are to be applied with warm salt solution, we are ready to begin. The large flat electrode is held by the patient—it does not signify in which hand. The patient's head is tilted slightly backward while he is directed to look straight ahead, which in effect is slightly downward, considering the position of the head inclined backward. The examiner elevates the lid of the eye to be observed with the thumb of the left hand when applying the ball electrode with his right hand to the patient's left ear, and *vice versa.* The ball electrode is applied to the tragus, and the tragus is pushed into the external canal.

The moment a reaction is noted it is called out to the assistant with the polarity, and the assistant calls back that the polarity is correct and announces the milliamperemeter reading, when a record is made of it. The polarity is switched or not as the assistant sees fit, the important point is that he is not to indicate it in any way, the object being to eliminate the possibility of any guessing.

As a result of his experiments the author is led to conclude that the normal reaction from the combined inner ear and nerve is:

Right ear: Cathode 4 ma., nystagmus to the right. Anode 4 ma., nystagmus to the left.

Left ear: Cathode 4 ma., nystagmus to the left. Anode 4 ma., nystagmus to the right.

That is to say, the cathodal reaction of one side balances with the cathodal reaction of the opposite side.

That the anodal reaction of one side balances with the anodal reaction of the opposite side.

That the cathodal reaction balances with the anodal reaction of the same side, and that the average reaction for normal individuals requires a current strength of about four milliamperes.

In the case of recent labyrinth suppuration, say in the first week, right side affected and left side normal, we have:

Right Ear: Cathode 7 ma., diminishes the existing nystagmus to the left, while cathode 8.5 ma., produces nystagmus to the right. Anode 1 ma., increases the nystagmus to the left.

Left Ear: Cathode 1 ma., increases the existing nystagmus to left. Anode 7 or 8 ma., arrests the nystagmus to left, or may throw it slightly to the right.

The author concludes:

1. The galvanic test is more accurate than either the caloric or rotational test in determining the function of the semicircular canals.
2. Besides being more accurate, the galvanic test is the least annoying to the patient, the most sensitive, and the easiest to control of the labyrinthine tests.
3. The galvanic test can be applied as a unilateral test of semicircular canal function in all sorts of pathologic conditions, which is an advantage that can not be conceded to the caloric.
4. The galvanic test is applicable to cases of suspected unilateral labyrinth suppuration with obstruction in the external canal where the caloric may fail us.
5. The galvanic test is a unilateral quantitative test of semicircular canal function, which is a distinct advantage over the rotational test, which at best is a bilateral test.
6. The galvanic test is the only one we possess for testing the function of the eighth nerve in cases of neuritis or cases of secondary degeneration following destruction of the inner ear.
7. The galvanic test is the only one we possess whereby we can make a differential diagnosis between labyrinth destruction, pure and simple, and eighth nerve neuritis.
8. The galvanic test is the only test available for determining the progress of eighth nerve neuritis, whether favorable or unfavorable.

Primary Disease of Labyrinth the Result of Focal Infection. Three cases of probably primary disease of the labyrinth as the result of focal infection are reported and the subject is discussed by G. E. Shambaugh.[3].

Accurate knowledge of the diseases of the internal ear has been difficult to acquire, owing especially to the difficulty surrounding the study of the pathology of the labyrinth. In recent years a great deal has been done to clear up obscure facts relating to the pathology of those changes in the labyrinth which occur secondary to infection in the middle ear. The pathology, also, in cases of long standing nerve deafness, is now well understood. There still remains a great deal of obscurity regarding the pathologic changes in the labyrinth, especially in cases of primary disease of the internal ear. Here we still find it necessary to piece out our knowledge by analogy from similar conditions occurring elsewhere. Fortunately, our increased knowledge of the physiology of the labyrinth enables us now to interpret much more accurately than heretofore the symptoms arising from disease of the internal ear. Improved methods for making a functional examination, moreover, enable us to detect more readily disturbance in the function of the labyrinth.

The clinical phenomena observed in these cases of primary involvement of the internal ear are quite definite, although the symptoms vary more or less widely in different cases. The defect in the hearing is always quite characteristic. It begins as a defect in the upper part of the tone scale, while the hearing at the lower part of the tone scale remains normal, even after the defect for the higher notes has become quite extensive. In a few cases the loss of hearing does not begin at the highest part of the tone scale, but consists of a defect more or less circumscribed in the middle of the tone scale. For example, one may find a defect especially marked for the C^4 fork, while the Galton whistle may be heard normally throughout its entire extent. Paracusis Willisii is never a symptom in these cases, and tinnitus aurium, although often present, is rarely, if ever, the annoying symptom which it so frequently is in cases of otosclerosis. In most of the cases both are involved; the shortening of bone conduction is always present.

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(3) Jour. Otol., Rhinol. and Laryngol., September, 1917.

In one-sided involvement the positive Rinne will be changed to a negative in those cases in which the defect in hearing is quite marked.

Symptoms arising from an involvement of the vestibular part of the internal ear constitute a very important part of the clinical phenomena observed in many of these cases. Primary disease of the internal ear constitutes, in fact, the most frequent cause for the symptom of vertigo. An involvement of the vestibular apparatus in these cases is, moreover, much more common than the occurrence of vertigo would indicate, as we have been able to ascertain since the introduction of tests for examining the function of the semicircular canals.

Another important clinical fact that has been brought to light by the introduction of the vestibular tests is that primary degeneration of the vestibular nerve occurs quite independent of a similar process involving the cochlear nerve. In these cases an occasional attack of vertigo is the only symptom indicating disease of the labyrinth.

We see, therefore, three distinct types of primary degeneration in the labyrinth: one where the cochlea alone is involved, producing nerve deafness and more or less tinnitus; the second, where the vestibule is involved simultaneously with the cochlea, producing, as a rule, occasional attacks of vertigo in addition to the symptoms arising from disease of the cochlea; the third type, where the vestibular nerve alone is affected, and where all symptoms indicating disease of the labyrinth may be absent, except for possible occasional attacks of vertigo.

The progress of this disease differs widely in different cases. Not infrequently there appears to be a gradually increasing degeneration of the parts involved. In many cases progress of the degeneration is accelerated by acute exacerbations. In others an acute attack is apparently followed by a long period of quiescence, when there is no progress in the degeneration—at least none that can be detected by our examinations.

The variations in the symptoms depending on the way in which the disease of the labyrinth progresses is especially striking for those cases in which the vestibular part is involved. An insidious degeneration produces no symptoms excepting the gradual development of nerve deafness associated, perhaps, with some tinnitus. Where the degeneration is accelerated by acute exacerbations, this is recognized by an increase in the deafness and the development of a more distinct tinnitus; and where the vestibular part is involved, by the occurrence of distinct attacks of vertigo. The symptoms arising from the vertigo sometimes quite overshadow the other phenomena. When the vertigo is severe enough to cause nausea and vomiting, the cause of the disturbance is often mistaken for some gastric disorder. The actual disturbance produced by the vertigo varies from a slight disturbance of equilibrium to a profound shock, which throws the patient violently to the ground and produces dizziness which does not disappear for several days or even weeks. Where one has an opportunity of examining a case during the attacks of vertigo, he is able to recognize the characteristic vestibular nystagmus.

The question of the diagnosis of labyrinth disease is especially interesting in those cases in which the principal symptoms are those resulting from the vertigo, such as nausea and vomiting. Before the introduction of the vestibular tests the diagnosis of a possible labyrinthine origin for the vertigo was based on the presence of symptoms of disease of the cochlea—that is, tinnitus and nerve deafness. In those cases in which a diagnosis could be made of a degenerative process going on in the cochlea, it seemed fair to assume a probable labyrinth origin for the vertigo, since it is known that primary degeneration in the labyrinth is the most frequent cause for this symptom. It is evident that in those cases where the degenerative process was limited to the vestibular nerve—that is, where the hearing was not affected—the labyrinth origin for the attacks of vertigo would often pass unrecognized.

The etiology of primary degeneration of the labyrinth is quite clear in many cases. It is not infrequently a complication of syphilis, both hereditary and acquired. It is observed also as a sequel of the infectious fevers, especially in mumps, typhoid, measles, and scarlet fever.

There remains, however, a large percentage of these cases of primary disease of the internal ear in which the etiology has not been accounted for.

In these cases focal infection is a possible cause. This conclusion is based upon the similarity between the manner in which the labyrinth involvement takes place and the involvement of other nerves where focal infection is known to be the cause. When the involvement of the labyrinth is associated with other evidences of systemic infection of focal origin, such as rheumatism or neuritis, one sees little difficulty in assuming a possible focal origin for the neuritis of the eighth nerve. Moreover, in cases in which the degeneration of the eighth nerve develops quite independently of any other manifestation of systemic infection, a possible focal origin should not be overlooked, for it is not an infrequent clinical phenomenon to observe a single nerve the seat of persistent neuritis from focal infection.

Primary Disease of the Labyrinth Producing Vertigo. This subject is taken up by G. E. Shambaugh,[4] who states that vertigo is now recognized to be as distinctly an aural symptom as is tinnitus, and when present indicates a disturbance of the vestibular nerve, either in its peripheral distribution in the semicircular canals or in its central pathways in the brain.

The author presents the following summary:

1. Primary disease of the labyrinth produces attacks of vertigo whenever the vestibular apparatus is involved by an acute process.
2. Hemorrhage into the labyrinth is much less common than was formerly supposed.
3. An embolus lodging in the labyrinthine artery occurs especially in caisson workers, as the result of gas emboli, and gives rise to the characteristic Ménière syndrome.
4. Syphilis in the secondary and tertiary stages, as well as in hereditary syphilis, not infrequently involves the internal ear and gives rise to vertigo.
5. Neuritis of the eighth nerve from overdoses of drugs, such as quinine, tobacco, and alcohol, may pro-

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(4) Jour. Amer. Med. Ass'n., Sept. 8, 1917.

duce neuritis of the eighth nerve with the Ménière syndrome.

6. Toxic neuritis of the eighth nerve as the result of infectious fevers frequently gives rise to attacks of vertigo.

7. The most frequent occurrence of vertigo is in connection with a primary chronic degenerative process involving the peripheral neurons of the eighth nerve and occurring independently of syphilis or the infectious fevers.

8. The probable cause for many of these cases is to be found in a neuritis of the eighth nerve, as the result of some chronic focus of infection, such as is so frequently seen in chronic disease of the faucial tonsil.

9. Attacks of vertigo occurring in connection with acute articular rheumatism are the result of neuritis of the eighth nerve and a symptom of the systemic infection from some primary focus.

The Value of Barany's Tests in Determining the Cause of Vertigo. I. H. Jones[5] submits the following classification:

1. Involvement of the ear-mechanism by a lesion in the ear itself.
2. Involvement of the ear-mechanism by a lesion involving the intracranial pathways from the ear.
3. Involvement of the ear-mechanism by ocular disturbance, either through the eye-muscle nuclei, or through association fibers from the cuneus to the cortical terminus of the fibers from the ear, in the posterior portion of the first temporal convolutions.
4. Involvement of the ear-mechanism by cardiovascular disturbance.
5. Involvement of the ear-mechanism by toxemias from any organ or part of the body.

So far as our present knowledge goes, this classification includes all the causes of vertigo.

It is to be noted that regardless of the cause, vertigo is due to the involvement of the ear-mechanism.

"It has been shown that a lesion of the vestibular portion of the internal ear produces dizziness, staggering, nausea, vomiting and perhaps diarrhea, just as an af-

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(5) Jour. Amer. Med. Ass'n., Sept. 8, 1917.

fection of the cochlea produces noises in the head. The general practitioner is familiar with the significance of tinnitus and recognizes that he is dealing with an ear condition. When confronted, however, with vertigo, nausea and vomiting, it is questionable whether, at the present time, the physician is apt to suspect the ears as the possible cause of all these symptoms. This, of course, is due to the newness of this study. When we realize that we otologists have come to recognize the importance of the vestibular labyrinth only in the last decade, it is only natural that the physician has not had his attention sufficiently called to the phenomena of internal ear disturbance. When a physician sees a case of vertigo, one of his first thoughts should be of the ear itself.''

Lesions within the brain, such as tumor, hemorrhage, thrombosis, infarct, abscess, gumma, tubercle, specific neuritis, multiple sclerosis, syringomyelia, poliencephalitis or meningitis, produce vertigo by affecting the intracranial pathways from the ear. Dr. Weisenburg has made this clear to us in his part of this symposium.

Ocular conditions producing vertigo are naturally best studied by the ophthalmologist. If the ear-tests fail to show any impairment of the ears or their intracranial pathways, an eye examination is indicated. Many cases of vertigo are cured by correction of ocular defects. This happens so often in the experience of ophthalmologists that many seem to be convinced that the eye is the most important organ to study in cases of vertigo. Surely, however, the eye is not the organ of balance. If you destroy the eye the individual becomes blind, but he does not become dizzy. On the other hand, we all know how destruction of the internal ear, or simply the slightest irritation of the internal ear, produces violent vertigo and disturbance of equilibrium.

Cardiovascular irregularities may produce vertigo by causing ischemia or hyperemia of any part or parts of the ear-mechanism—either within the internal ear itself or its intracranial pathways, or in its associated centers in the cerebral cortex.

Toxemias affecting the ear-mechanism may be grouped into two classes:

(*a*) Evanescent toxemias which have produced no degeneration of the cellular elements within the internal ear or its intracranial pathways.

(*b*) Toxemias which have produced a definite impairment of some portion of the ear or its pathways.

The cases of evanescent toxemia constitute a very large proportion of the cases of vertigo that are seen by the physician. The simplest illustration of this type of vertigo is the dizziness produced by the ingestion of alcohol. The mere presence of alcohol in the stomach does not produce vertigo. It is only when the alcohol reaches the ears and the brain that the person becomes dizzy.

Toxemias which produce a definite impairment of the internal ears include the powerful toxins, such as in mumps or syphilis, and also the repeated assaults of a milder toxin, such as those from the gastro-intestinal tract or from a focal infection.

Vertigo in Suppurative Conditions. That vertigo in any suppurative lesion of the ear is always a symptom to be treated seriously is emphasized by P. D. Kerrison.[6] If due to a suppurative process confined to the tympanum or mastoid, and exerting an influence only indirectly on the labyrinth, the aurist's best judgment is required as to how, and particularly when, to deal surgically with a lesion which in recurrence may include the labyrinth. If the vertigo is clearly a result of labyrinthine infection, the need of sound surgical judgment is even greater.

In considering questions of treatment, we shall do well to bear in mind the fact that patients do not die of suppurative labyrinthitis *per se*. Those patients who die on account of this lesion invariably do so as the result of a secondary intracranial infection: meningitis, cerebellar abscess, or sigmoid sinus thrombosis. Operative technique is most important; it is not, however, the sole desideratum in dealing with the infected labyrinth. An operation, logical enough in intent, may carry overbalancing risks of causing that which it seeks to avert, that is, a spread of infection toward the meninges. There is also in suppurative labyrinthitis, more perhaps

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(6) Jour. Amer. Med. Ass'n., Sept. 8, 1917.

than in any other surgical disease, a period of greatest operative safety as also of operative risk.

There is no absolutely safe method of treatment; no rule of action which in the varying aspects of the disease may be relied on to save all its victims. In each individual case, surgical treatment must take account of the following several points: (*a*) immediate chances of recovery, that is, with and without operation; (*b*) possible influence of any operation in causing a spread of infection; (*c*) stage of the disease in which operative intervention is safest, and (*d*) ultimate risk to life if the labyrinthine focus of infection is not surgically eliminated.

Labyrinthine Ophthalmostatics. After reviewing the history of this interesting subject, Stahli[7] proceeds to divide the animal kingdom into two classes. In the first class are those animals in whom the position of the eyeballs and their movements are entirely or to a large degree regulated by labyrinthine stimuli, where for instance if the head is fixed, the eyes are fixed and where the slightest head movement is accompanied by compensatory movements of the eyeballs. For the most part this group comprises all the lowest animals and a few of the higher types such as the guinea-pig and the elephant. The second class includes those in whom the influence of the labyrinth is not so clear because these impulses are complicated by impulses (some are known and others are unknown) originating in the cerebrum, dependent on optic, accoustic and psychic stimuli. The eye movements of otic origin are brought to the fore only when the cerebral influence is suppressed or the labyrinth overstimulated. This second group embraces the human being and the higher animals.

Considering, then, the question as to what the nature of the regulating influence of the labyrinth is on eye movements and how and when it acts, the author first points out the important fact that the muscles of each eyeball receive impulses from both labyrinths which normally balance each other in the quiescent state of the eyes through equal tension of opposing eye muscles. This is called the normal tonus. When one labyrinth

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(7) Corr-bl. f. Schweiz Aertze., July 7, 1917.

exerts a stronger influence than the other, eye movement is the result. The influences that may bring this about may be mechanic, thermic, electric and nervous. The nervous stimuli are those coming from the brain or spinal cord which are constantly in play and which as yet are not fully understood.

Under the heading of mechanical stimuli, Stahli first explains the nystagmus resulting from turning movements and points out the interesting fact that when the cerebral influence is suppressed or negative as in anesthetized patients, the new-born or in imbeciles, there is only one phase to the nystagmus, namely the slow component which is of vestibular origin.

Furthermore, in animals it requires but very little turning to produce eye movements, such movements being a prompt slow and compensatory turning of the eyeballs in the direction opposite to that of the head motion, up to a certain angle from the original.

One of the problems the author mentions is that of the "nystagmus minorum," the eye movements that are found among coal miners.

He claims that from 3 per cent. to 20 per cent. of all workers in coal mines suffer from this trouble. The trouble comes on after four or five years of this sort of labor and renders the men unfit for their work. They may be cured by changing their occupation but the trouble always returns if they go back to mining. Chronic alcoholism predisposes to and aggravates the trouble and yet at the time the subject is under the influence of liquor the eye movements cease. The movements are more pronounced in the dark than in the light and also more noticeable when the patient looks up than when the gaze is forward or downward.

Another form of nystagmus where the influence of the labyrinth must be of some importance is that of blind nystagmus. The movements are rather irregular, consisting of a slow movement to one side, a fluttering or rolling of the eyeballs and then a quick movement back to the other side, more quick flutterings, etc., etc. These movements are practically continuous while the patient is awake but cease entirely during sleep. Furthermore, the blind person is unaware of these movements, neither does he know what the position of his eyeballs is at any given moment nor can he direct them if requested.

Another interesting type of nystagmus that is not yet understood are the cases of typical spontaneous nystagmus (horizontal, rotary or vertical) existing from early childhood in individuals whose vision is good. These cases were formerly thought to be due to a persisting weakness in flexing the eyes due to faulty vision in childhood, but recently it has been assumed that they are due to vestibular stimuli because the eyes have been found to be of normal conformation and the vision as good as the average.

Finally, the author states his belief that certain forms of squint are due to labyrinthine stimuli.

MILITARY OTOLOGY.

The Organ of Hearing in the War. This subject is discussed by E. H. Moure and P. Pietri,[1] and abstracted in the *Journal of Laryngology, Rhinology and Otology.*

Cerebral Deafness: The condition thus defined by the authors is a psychosis. The following are the salient points of the article, which is lengthy:

Functional tests enable us to decide between an affection of the cochlea, or vestibule, or both. If there be disagreement between the various tests, the factor or exaggeration may be responsible.

The literature gives no auditory psychosis. The patient, whom the authors designate as "cerebral," shows a hebitude, apathy, indifference to his surroundings, disinclination to be questioned or to assist the expert in examining him. On the other hand, the truly deaf man attends to the facial expression of his interlocutor tries to lipread, holds forward to listen. In contrast with both the two preceding types, the exaggerator shows a striking discrepancy in hearing tests if these be repeated several times, avoids the examiner's eye, and in some way, as by blushing or confusion, shows self-consciousness if personal remarks are made about him.

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(1) Rev. de Laryngol.

Clinical Signs: Increased, diminished, or total loss of hearing. Anesthesia of membrana tympani, partial only, never absolute. Hyperesthesia of the skin of pinna and mastoid occur; but may disappear while the patient's attention is directed to something else which interests him. Before labeling such cases "hysterical" we must construct a more complete syndrome by finding characteristic stigmata of vision, smell and neural function.

Mèniére's triad may be found; in such cases it is fortunate that the vertigo, which most distresses the patient disappears earlier than the tinnitus and deafness, which he finds easier to bear.

In prognosis, the most important factor is the near or remote prospect of return to the Front.

Treatment is by rest, sedatives, tonics mastoid counter-irritants, and auditory re-education.

Among tests for simulated deafness, Dundas Grant's is most useful. The patient's pupils, after a brief contraction, dilate if he really hears a sound—such as a whistle.

To evoke reflexes by a sudden dropping of a heavy weight is an unreliable test, for we know that the absolutely deaf may have a heightened appreciation of vibration, so that, for instance, they are quick to recognize the step of someone marching at their side.

Lombard's use of Barany's noise apparatus is commended as a test.

If a patient suffers from unilateral cochlear or cerebral deafness, a tuning fork on the vertex is referred to the healthy side; if the meatus be closed, the sound will be intensified. A malingerer will imagine that by closing the meatus of the only side which he claims to hear, he should be made totally deaf; he will fall into the trap by saying that now he does not hear at all. (Moure).

Other well-known tests with tuning-forks, auscultation-tube, and clothes-brush are described.

The authors point out that a man who is truly deaf and who has learned to lip-read can do so equally well with a noise apparatus working in his ear, whereas the malingerer appears to learn lip-reading, but is helpless when the noise apparatus is applied.

War Injuries and Neuroses of Otologic Interest. H. J. Marriage[2] states that injuries of the auricle and external meatus may be caused by a bullet passing through the ear or by small pieces of metal which either lodge in the auricle or pass through it; at times the ear is to a large extent torn away. In dealing with these cases, all that is usually required is to clean up the wound, remove fragments of metal, and apply antiseptic dressings. If the drainage is very extensive it is often possible to save the greater part of the ear by performing a plastic operation, as the blood-supply to the auricle is extremely good. The chief complication which is liable to occur is perichondritis, with at times necrosis of the cartilage, and should this take place it is generally necessary to dissect out the cartilage before healing will take place.

Wounds of the external meatus are usually caused by missles which enter either in front or behind the ear and pass right through the meatus; the cartilaginous meatus appears to be most frequently affected, though at times the bony canal may also be damaged. In its course the missile often injures the facial nerve and may also cause more or less injury to the mastoid process. In one case a bullet entered just in front of the tragus passed right through the external meatus, struck the tip of the mastoid causing a slight fracture which was seen in *x*-rays, and emerged behind and below the mastoid process. The wound of exit was about the size of a large hazel-nut and gradually filled up without any involvement of the mastoid. There was also some weakness of the lower part of the face, but this recovered. In the meatus there were small perforations in the anterior and posterior walls, which were granulating; these were treated by syringing and plugging the meatus. The drum was not damaged, but there was small external ear deafness probably due to concussion.

Rupture of the tympanic membrane has been very common and mainly due to high explosive, and is much more likely to occur when a bomb or shell bursts in a confined space such as a trench or dug-out. It is probably due to increased pressure on the drum; but one

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(2) Jour. Laryngol., Rhinol. and Otol., June, 1917.

must not forget that in case of windows the glass falls outward owing to the rarefaction of the air after the explosion, and it is possible that this rarefaction may also have some effect on the drum.

The condition of the nose and nasopharynx, so far as could be determined, had nothing whatever to do with the frequency of the injury, as in the majority of the cases examined both were quite healthy and free from deformity.

The commonest symptoms are marked deafness, with at times loss of consciousness for a few minutes and often slight bleeding from the ear, which may be followed by a little serous discharge; rarely there may be tinnitus and slight vertigo, due to involvement of the internal ear. As regards the hearing, in most patients, when tested with tuning-fork (C) even a few days after the injury, the bone-conduction was normal, but the air-conduction was diminished, the amount of diminution varying according to the extent of the damage; in several cases the air-conduction was slightly subnormal when tested with tuning-fork (C5). Complete loss of hearing has not been observed in any of the reports which have come under observation.

Direct injuries of the labyrinth by a missile as a rule are fatal, but in a few cases the patient has survived, and Cheatle has reported a particularly interesting case, in which on July 1, a rifle bullet entered the left temporal region above the zygoma, and emerged just to the left of the second cervical vertebra. The man was unconscious for about twelve hours, and was then about to crawl back. When seen July 11 by Dr. Collier, his general condition was good, temperature 100° F., pulse 84. He was quite deaf in the left ear, from which there was a copious discharge of cerebrospinal fluid. He spoke with a husky voice. There was complete paralysis of the left trapezius and sternomastoid muscles and of the left side of the soft palate. There was no facial paralysis. Pupils were equal and reacting to light. No loss of sensation. The tongue was protruded straight and the diaphragm moved well.

August 18 the patient was discharged to a convalescent home with the wounds healing.

Indirect injuries of the labyrinth in fracture of the skull may be caused by falls, blows on the head, or by bullet wounds. Syme and Foster state in their paper that if the force is applied to the side of the head in the direction of the petrous pyramid we get a longitudinal fracture which usually runs along the roof of the middle or clift, and, as a rule, in these cases the labyrinth capsule remains intact; if, on the other hand, the force is applied to the back of the head, we get a transverse fracture which runs at right angles to the long axis of the petrous pyramid and always injures the labyrinth. As a rule, these fractures pass through the vestibule. The symptoms of such injuries are extreme or total deafness, marked disturbance of balancing, with loss of the cochlear and vestibular functions. If the labyrinth is injured there is an escape of cerebrospinal fluid along with the blood. In the cases in which the labyrinth capsule is not injured, there is no escape of cerebrospinal fluid; but, nevertheless, deafness results from hemorrhage into—or tearing of—the eighth nerve. One or two of the patients with fracture of the labyrinth have been microscopically examined many years after the accident, and filling up of the hollow spaces of the labyrinth by new connective tissue and bone has been found along with secondary degenerative atrophy of the nerve structure.

Concussion deafness may be due to the constant noise of the guns firing day after day, or to the explosion in the immediate neighborhood of the patient of a shell containing high explosive.

In the former case the results are similar to those seen in peacetime in naval gunnery officers and boiler-makers, and a slight amount of permanent deafness usually persists if the patients have been frequently exposed to the noise for long periods.

The deafness due to the explosion of a shell is generally for a short time very severe and at times the patient has been rendered unconscious, but so far as is known the deafness has never been absolute.

As regards the symptoms, the patient has often complained only of intense deafness with headache, but at other times there has been marked tinnitus in addition;

in more severe cases there may be nausea and vomiting. It is more common for only one ear to be affected, though both may be, especially if the shell bursts just in front or behind the man.

Psychical deafness is usually bilateral and is commonly seen in those who have suffered a severe shock, *e. g.,* by being buried by a shell, without any visible injury being present. The deafness is usually absolute, nothing being heard either by air or bone conduction. It is generally accompanied by other nervous signs and symptoms, such as loss of voice, narrowing of the field of vision, tremors, irregular paralysis, and areas of anesthesia. Spontaneous nystagmus is absent.

During a bombardment a private suddenly became unconscious without any definite cause and remained so for two days. On recovering consciousness complete bilateral deafness was not at once noticed; there was no giddiness, no bleeding from the ears; he had spasms of the neck. No organic lesion was discovered, but the deafness remained and he could not hear the loudest shouting or his own voice. The vestibular reaction to cold syringing was normal.

A Belgian soldier was blown off his bicycle in the retreat from Antwerp and had been completely deaf in both ears, aphonic, and paralyzed in his left arm and leg from that time until July, 1916. Rapid recovery occurred on the application of the battery after resistance to many forms of treatment, including hypnosis.

These patients often recover with a counter-shock, with rest and massage, or by giving an anesthetic; at times the administration of asafetida and valerian is useful.

To distinguish this form of deafness from malingering is sometimes difficult, but it can generally be accomplished if a thorough examination is made, as the patient is very liable to give himself away during the performance of the various tests. The malingerer is usually sullen and defiant, has all his wits about him, and replies after deliberation, whereas a patient with psychical deafness has signs and symptoms of nervous breakdown.

Diagnosis of War Deafness. Branjard(3) reviews the methods generally employed to measure the degree of deafness and to detect malingering. He shows first how the methods based on the vestibulo-ocular or nystagmus reflexes and the cochleo-palpebral reflexes are in themselves insufficient often leading to regrettable error in accusing wounded men of malingering who were acting in perfectly good faith; because in these soldiers the ear is often sensitive to such reflexes even after the deafness is complete.

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(3) Presse méd., Feb. 15, 1917.

The author discusses various acoumeters which produce either noises or musical sounds, or reproduce the voice. He claims that the first two do not stimulate the inner ear in the same manner as the spoken word and therefore he relies on the synthetic production of the voice in testing these cases which alone permits a more certain measuring of the degree of the deafness and more easily excludes malingerers. His conclusions are based on an eight months' experience in military hospitals and an observation of over 200 cases of war deafness.

Exaggerated Auditory Motor or Jump Reflexes. This condition was noticed by A. F. Hurst[5] in some of the soldiers who have been subjected to the shock of bursting shells.

A sudden noise normally causes an individual to jump and blink, and at the same time his pupils dilate; the "jump" at any rate, is a protective reflex, and represents the preparation for flight or fight.

In war neuroses, in which the reflex is exaggerated, jumping continued during sleep and deep hypnosis, although the patient does not hear the noise which induces it, even in a dream. That the reflex is quite independent of actual hearing is shown by the fact that during deep hypnosis, with the eyes open, individuals in whom the reflex is normal or only slightly exaggerated do not jump or blink, and the pupils do not dilate even when a poker is banged against a shovel within a foot of the ear, although they answer even whispered questions and obey whispered commands.

It has been pointed out that the reflex is abolished in complete hysterical deafness, so it must occur above the synapsis, which is unswitched in this condition. This

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(5) Jour. Laryngol., Rhinol. and Otol., March, 1918.

suggests that the reflex center is not the posterior corpus quadrigeminum or the corpus geniculatum, and the close relation of these centers to the blinking and the sympathetic pupillo-dilator center in the neighborhood of the third nerve nucleus and to the anterior corpus quadrigeminum and red nucleus, in each of which a descending motor track originates, gives an anatomic basis for this view. The very common exaggeration of this reflex in soldiers suffering from certain war neuroses is not, therefore, correctly described as hyperacusis, for the sense of hearing may be no sharper than normal, and actual hearing need not occur at all, as the reflex occurs when they are asleep and hypnotized; it is simply a part of the general exaggeration of the defensive reflexes, which is a very characteristic feature of these war neuroses that are due rather to emotions than to actual concussion of pure terror. The man jumps violently and trembles from head to foot at the slightest sound and raises his arm as if to protect his face from a blow and hides his head under the bedclothes when anybody approaches him. Terror is at first actually present, for the patient never ceases, while every sound reminds him of the bursting of shells. But after all trace of terror has disappeared as a result of suggestion of the horrors of war the appearance of terror may continue unabated. This is due to jumping and flinching being defensive reflexes; the intense emotions to which the patient has been subjected leads to such an increase at the excitability of the central nervous system that the exaggerated reflexes persist after the cause of their exaggeration has disappeared.

Ear Affections in the Swiss Army. Schlittler[6] reviewed 368 cases of ear affections examined by him among the Swiss army and found them occurring in the following groups: External ear, sixty-three or 17.2 per cent.; middle ear, 204 or 55.2 per cent.; inner ear, ninety-one or 24.8 per cent.; simulation or exaggeration ten or 2.8 per cent.

After listing the various affections he notes the striking fact that the majority of the cases were chronic rather than acute.

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(6) Corr.-bl. f. Schweiz. Aertze., June 9, 1917.

The percentage of acute diseases of the ear is much less in military than in civil life because of the hardier physical condition and better resistive powers of the soldiers as compared to civilians. On the other hand, previously existing chronic affections become aggravated in military service and predispose the men to more severe after-effects of injury to the ears.

These traumas are of three varieties: first, injury by violence directly applied to the ear; second, violence indirectly applied as through fractures of the skull, and third, violence through disturbance of air pressure as in the vicinity of shell explosions.

In the first class the author considers traumatic rupture of the drum and points out that they are frequently followed by severe infections of the middle ear leading to dire after-effects. The characteristic findings, namely, irregular perforations of the drum showing sharp bloody margins rapidly disappear so that after three or four days there is nothing about the perforation to indicate its etiology.

The second variety due to fractures of the base may produce lesions of the cochlear and vestibular nerves combined or separately, resulting in partial or complete deafness with subjective noises or in disturbances of equilibrium, nystagmus, vertigo and loss of vestibular reactions. In many of these cases in which the results were extreme close interrogation disclosed a previous history of some ear trouble which had not been gone into at the time the patient was first admitted into the army.

The third variety due to disturbances of air pressure may act either by one sudden violent explosion or through repeated explosions. Both types cause degeneration of Corti's organ and the adjoining nerve fibers and ganglion cells. The former, however, shows in addition symptoms of disturbed vestibular function as well as psychic disturbances. Here also those men who gave a history of some previous ear trouble suffered the severest after-effects and lost their hearing completely.

In addition to these "chronic acoustic traumas" there were other cases of nerve deafness due to previous acute or chronic infections such as the exanthemata, rheumatism, typhus, lues and meningitis. Such men naturally are more susceptible to traumatic influences and therefore should have been barred from military service had they been closely examined before their admission into the army.

A thorough review of this series of cases discloses the necessity for a more careful examination of army recruits for existing ear troubles which may impair their usefulness as soldiers.

Ear Injuries in Interned Soldiers. Hug[7] reports eighty cases occurring in 300 interned soldiers as follows: Sixty or 75 per cent. affecting the ear; sixteen or 20 per cent. affecting the nose and adjacent structures; three the larynx and one the lung.

Of the ear injuries 40 per cent. were due to direct violence from bullets or shell fragments, generally resulting in fractures with marked destruction. Four cases of atresia of the auditory canal were due to fractures of the mastoid. In two cases there was traumatic brain cyst. Hug advises against operation in such cases because of the danger of meningitis following the draining of the fluid. One of his patients who was operated on died despite the use of large amounts of hexamethylenamine and repeated lumbar puncture.

In all but two of the ear cases there was a traumatic deafness. The vestibular reactions were either excessive or entirely lost. The drum membrane was generally intact. Of all ear traumas 60 per cent. are due to indirect violence through the sudden change of air pressure in the vicinity of the explosion. Half of the men previously with good hearing showed a normal drum and a nerve deafness either unilateral or bilateral in different degrees. In many the hearing was restored promptly, or else more gradually within a few months. He believes the latter to be cases of labyrinth shock, or hemorrhage with subsequent absorption.

The rest of the ear cases (40 per cent.) developed suppurative otitis media following the rupture of the drum. Here the hearing was markedly disturbed and in a few cases completely lost. A few with extreme destruction of the drum developed cholesteatomata and were later subjected to a radical mastoid. Sixteen of this type

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(7) Corr-bl. f. Schweiz Aertz., Sept. 15, 1917.

were operated on under local anesthesia. Hug used 2 per cent. novocaine injected circularly about the auricle by deep puncture.

The nasal cases were usually associated with extensive loss of tissue. In most of them the sinuses were infected and frequently shell fragments were found. Loss of the septum, sequestration of portions of the ethmoid and synechia were frequent complications. Parosmia and anosmia were secondary results and as a rule healing was prolonged.

The two larynx cases in the series were rather interesting. In one there was a recurrent paresis on one side with an abductor paresis on the other: in the other case there was a scar formation closing in half of the larynx like a diaphragm requiring excision.

A Gun-Shot Wound Involving the Internal Ear. This case is reported by H. L. Whale.[8] The patient was admitted to the hospital Dec. 29, 1915, with a bullet wound in the left frontal eminence; no wound of exit. Skiagrams: The first on admission, showed no bullet, but only splintered bone below the wound; the second on February 2, showed no bullet, but a rarefied area, where at operation the bone spicules had been removed.

Treatment: On admission the patient was anesthetized and trephined. Fragments of bone were removed from the frontal lobe of the brain and the wound dressed with gauze. There was nothing to suggest a fractured base. There were no signs of focal injury nor of intracranial pressure. As regards his head wound, the patient made an uninterrupted recovery.

Evidence of cerebral irritation (sulkiness, mischievousness, resentment of any one approaching him) persisted for some days, and disappeared with the sudden onset, on January 8, of escape from the left ear of fluid, which flowed slowly but steadily, was quite clear, and reduced Fehling's solution. With the flow of cerebrospinal fluid all signs of cerebral irritation ceased. The flow persisted until January 24.

Otoscopy: The right ear was normal. In the left ear, half an inch from the external meatus, a sessile swelling of the bony roof bulged downward, occluding three-

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(8) Brit. Med. Jour.

quarters of the meatal lumen and preventing inspection of the membrane. It was covered with intact skin, sensitive and stony hard to the probe, and resembled a meatal exostosis. It was impossible to be certain that it was the result of the injury. This appearance persisted unchanged as long as the patient was in the hospital, so that the membrana tympani was never seen.

Hearing was at first good, and equal on both sides to watch, speech, and whisper; no tuning-fork was then available. The hearing on the right remained normal, while on the left it become progressively worse. On January 26, he heard speech left 18′, whisper 4″; on February 6, speech 2′, whisper ½″. On February 24 a tuning-fork showed (D. V. 512); Weber to right; absolute bone-conduction on left—15 secs. On and after March 5, for speech, watch, and tuning-fork, both air and bone conduction were *nil* on the left side.

Equilibrium: As soon as the patient was well enough to be lifted into a sitting position he fell over on to his left side. In a few days he could sit up without support, and could walk unsteadily by January 15. After January 26, he could walk straight with his eyes open; but with eyes shut staggered to the left. He next developed a crab-like gait (with eyes shut), diverging constantly to the left, and crossing the right foot over the left as he walked, to avoid falling to the left. On and after March 5, his gait was normal, with eyes opened or closed.

Evidence as to cerebellar or meningeal lesion: There was never any asthenia, dysdiadococinesis, giddiness, vomiting, or nausea. There was no indication for lumbar puncture or examination of optic discs.

Nystagmus: No galvanic apparatus or rotation-chair was available. Repeated observations were made, with the head in various positions and water at different temperatures; and the ears were irrigated both separately and simultaneously. The mean results obtained were as follows:

Spontaneous nystagmus: On deviation to right: Fine, pure horizontal, never of more than first degree. This became progressively less marked, and no nystagmus was obtainable after February 17. On deviation to left: No nystagmus.

Caloric response: Head backward 60 degrees; water at 90° F. run in for two minutes. Right: During the persistence of spontaneous nystagmus on deviation this was always made coarser and raised to third degree. After spontaneous nystagmus had ceased (February 17), irrigation elicited a similar but less violent normal response. Left: On deviation to this side there was never any response to irrigation. But, for as long as the spontaneous nystagmus to the right persisted, this could always be inhibited for periods varying from two to fifteen minutes by warm irrigation to the left ear.

To test this inhibitory effect of stimulating the left labyrinth on nystagmus to the right, the two ears were simultaneously irrigated several times after February 17, when spontaneous nystagmus to the right had ceased. But at no time did the irrigation of the left ear have any effect on the nature or duration of the nystagmus obtained by simultaneous irrigation of the right ear.

On his discharge to the base, after ten weeks in hospital, the man had on the right side normal caloric labyrinthine response and normal hearing. On the left side, total loss of labyrinthine response and complete deafness. Gait and general health were normal.

The signs of cerebral irritation during the early days disappeared suddenly and permanently with the appearance of cerebrospinal otorrhea, which again ended spontaneously sixteen days later. Although there had been no classical signs of compression, it seems reasonable to suppose that the irrigative stage might have merged into such, and that the cerebrospinal flow was Nature's decompression. The gradual loss of spontaneous nystagmus to the sound side and of a tendency to fall to the injured side, were merely evidence of recovery from partial or complete unilateral loss of labyrinthine function. Since stimulation of the left labyrinth always inhibited any spontaneous nystagmus to the right, but later on failed to inhibit caloric nystagmus to the right, and since also there was a progressive loss of hearing, there was obviously a progressive lesion of cochlear and vestibular apparatus.

The results of caloric tests on the left ear seem puzzling. Whether the lesion was in any part of the left external semicular canal or in the nervous mechanism proximal to this, it was striking that stimulation should inhabit nystagmus to the left.

The bullet was never removed from the skull, nor seen in a skiagram. It may never have entered, although the shape of the wound suggested penetration rather than glancing. If it is still in the patient's head, that would not seem to account for the findings here reported.

Equilibrium Tests as Used in the Examination of Aviators. These tests are described by C. P. Small.[9] The Barany rotating chair, or the Jones modification of the chair is used:

The Barany Chair: The essential factors in the construction of the chair are a foot-rest to allow the person examined to be revolved freely with his feet resting on the foot-rest, a few inches above the floor; a head-rest to hold the head firmly at the desired angle; a stop catch by which the examiner by pressing with his foot can instantly bring the rotating chair to a stop; and a long arm extending upward behind the chair at a slight angle, by means of which the examiner is able to rotate the chair easily. Before making the tests, it is well to have the applicant's ears examined to see that there is no impacted wax in the external auditory canals, and also to ascertain the condition of the eustachian tubes, that is, whether or not they are patulous. Applicants are advised to eat a very light luncheon before having this examination, as nausea and vomiting occasionally follow the test.

Method of Examination: The examiner is provided with a stop-watch. The applicant sits with eyes closed and his feet on the foot-rest; his head is against the head-rest tilted at an angle of about 30 degrees. The chair is rotated ten complete revolutions toward the right in exactly 20 seconds. The chair is then brought to a sudden stop and the applicant is told to open his eyes and look straight in front of him at some distant

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(9) Jour. Amer. Med. Ass'n., Sept. 29, 1917.

object. If his horizontal canals are functioning normally, there will be a lateral nystagmus, to the left, continuing for about 25 seconds, although a variation of 10 seconds below or beyond this time is allowable. The process is then repeated, turning the chair this time to the left, which will produce a nystagmus to the right.

The Pointing Test: The "pointing test" is next made as follows: The examiner stands directly in front of the chair, and the applicant sitting erect with his eyes blindfolded is told to extend his right arm directly in front of him and with his forefinger touching the finger of the examiner held at that point. The applicant is now told to raise his arm above his head and quickly bring it down again to exactly the same spot, that is, to touch the examiner's finger when he brings his arm down. He is then made to do the same thing with his left arm.

The applicant now assumes an easy position with his arms resting on the arms of the chair; the chair is rotated rapidly to the right, ten times in 10 seconds. The instant the chair is brought to a stop, the examiner again holds his finger in contact with the applicant's right forefinger directly in front of him, and the applicant is again told to raise his arm and quickly bring it down to touch the examiner's finger. In the normal condition the applicant will not touch the finger, but will "past point" several inches to the right of it. On repeating the movement he will again point to the right and usually even on the third attempt. Any further repetitions of the movement should show a restoration of the normal equilibrium, and the finger drop in the right direction. The test is then repeated, rotating the chair this time to the left, when the finger should "past point" to the left in the same way. The "falling test" is now made, to ascertain the condition of the vertical canals. The applicant bends his body forward at an angle of 90 degrees, his eyes still blindfolded, and his head resting on his fists held on his knees. The chair is rotated rapidly toward the right, ten times in 10 seconds. The instant it is brought to a stop the applicant is told to sit straight up. If normal he will fall toward the right side. Assuming the same bent position again, he is rotated toward the left in the same way, and on attempting to sit up straight, he will fall to the left side. The rotation method is now used exclusively in examining the sense of equilibrium, having superseded the caloric method as being more rapid, easier in application and more exact in determining the integrity of the entire vestibular function.

Classification of War Injuries to the Labyrinth. According to J. S. Fraser[1] war injuries to the labyrinth may be classified as follows: (*A*) Direct injury due to bullets or fragments of shell or bomb. (*B*) Indirect injury in fractures of the skull which involve the labyrinth capsule. (*C*) "Noise" deafness, which is especially seen in artillarymen and naval gunners, but also occurs in other soldiers and sailors to a less extent. (*D*) "Shell" or "explosion" deafness, due to the bursting of mines, shells, or bombs close to the soldier.

In the majority of cases in which the labyrinth is involved the soldier is killed outright from the concomitant lesion of the brain. Such cases, of course, do not come under clinical observation. Haymann states that injuries of the labyrinth are almost always combined with lesions of the middle ear. In rare cases, however, the bullet may enter through the face and reach the labyrinth without penetrating into the middle ear. There is usually extensive fissuring or splintering of the petrous bone, often followed by intracranial complications. As a rule, the whole labyrinth is involved. The bullet may come:

1. From above and in front with a downward and backward direction.
2. From in front, against the face, injuring the eye and maxillary antrum or the mouth before reaching the labyrinth. The wound of exit may be in the mastoid, in the occipital region, or in the neck on the same side, or on the opposite side. The bullet may, of course, remain in the skull.
3. The most frequent injuries of the labyrinth which can be recognized result from lateral wounds penetrating the ear or its neighborhood.
4. In some cases the shot is an oblique one, the bul-

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(1) Jour. Ophthal. and Oto-Laryngol., April, 1918.

let entering in front of the ear and coming out in the neighborhood of the mastoid process. The symptoms of labyrinth injury are well known—deafness, tinnitus, giddiness, disturbance of balancing, vomiting, nystagmus, etc. According to Lermoyez, in the severely wounded men who survive, the deafness is only noted when the bandages are removed. Haymann states that in 50 per cent. of these cases death occurs later from septic meningitis, which may be due to infection carried in by the bullet or shell splinter, or may be secondary to infection from the Eustachian tube. The onset of meningitis may be delayed as long as six weeks. Bullets and bits of shell may remain a long time in the labyrinth without giving rise to severe complications, and they may even heal in this situation, if the middle ear be not injured (Haymann). On the other hand, these foreign bodies usually give rise to pain, which is only relieved by their removal. Some surgeons hold that it is better to wait, while others believe that an immediate exploratory operation should be carried out for fear of intracranial complications. Lermoyez himself holds that it is better to wait if the wound be recent and aseptic, but to operate at once if otorrhea be present. Further, if facial paralysis, labyrinthine disturbance, or meningitis exist, one should operate at once.

The labyrinth may be indirectly injured by blows on the head from a rifle butt or sword, or by shot-wounds of the head or face, especially by those which involve the lower jaw, which, of course, articulates with temporal bone. Falls on the head may cause fracture of the base, and thus injure the inner ear. Haymann states that basal fractures may run parallel to the long axis of the petrous pyramid or may cross it:

1. If the force is applied at the side of the head in the direction of the petrous pyramid we get a longtitudinal fracture, which usually runs along the roof of the middle-ear cleft. At its outer end the lines of fracture may turn outward to the external meatus, or may pass to the squamous or mastoid regions. As a rule, in these cases, the labyrinth capsule remains intact, but the stapes may be displaced, or there may be hemorrhage or tearing of the round window membrane.

2. On the other hand, if the force is applied to the back of the head, we get a transverse fracture which runs at right angles to the long axis of the petrous pyramid and always injures the labyrinth. As a rule, these fractures pass through the vestibule. The symptoms of such injuries are extreme or total deafness, marked disturbance of balancing, with loss of the cochlear and vestibular functions. If the labyrinth be injured there is an escape of cerebrospinal fluid from the ear along with blood. In the cases in which the labyrinth capsule is not injured there is no escape of cerebrospinal fluid; but, nevertheless, deafness results from hemorrhage into —or tearing of—the eighth nerve. On lumbar puncture blood may be present in the cerebrospinal fluid (Ferreri). One or two of the cases with fracture of the labyrinth have been microscopically examined many years after the accident, and filling up of the hollow spaces of the labyrinth by new connective tissue and bone has been found, along with secondary degenerative atrophy of the nerve structures.

It is difficult or impossible to draw a sharp line between "noise" and "explosion" deafness. Undoubtedly, it is due to prolonged over-stimulation of the auditory nerve endings in boilermakers, riveters, railwaymen, etc. On the other hand, there are in war many cases of pure explosion deafness due to the bursting of a shell or bomb close to the soldier, and the consequent great variation in air-pressure which produces a coarse mechanical effect on the labyrinthine structure. There is, however, a third group in which both elements are present, *i. e.*, the acoustic over-stimulation and the mechanical injury found in artillerymen, naval gunners, and other members of the forces.

The pathology of explosion or shell deafness is still very vague. As yet, we have no published accounts of the microscopic examination of the ear from such cases. Theories as to the pathology may be divided into three groups: (*a*) Some otologists believe that there are changes in the membranous labyrinth of a molecular nature leading to degenerative neuritis affecting the nerve-endings, ganglia, etc. (*b*) Others hold that the membranous labyrinth is torn (Stenger, Barnick, and

Sakai), and that hemorrhages occur. Yoshii found that explosions produced close to the ears of animals caused rupture of the drum-head and hemorrhages in the cochlear and vestibular apparatus. Hoessli caused explosions at a great distance from the animals, and did not find rupture or hemorrhage but noted changes in Corti's organ, the cells of which were shrunken and flattened as from excessive movements of the basilar and tectorial membranes. (*c*) Zange has experimented on animals, but has found no changes in the labyrinth. He therefore believes that the condition is due to small hemorrhages in the pons, medulla, and cerebellum.

Haymann calls attention to the injurious effects of long-continued shelling on the soldiers exposed to it. The effects of the shell explosion depend on the caliber of the shell, its explosive force, its distance from the soldier, and the angle at which the explosion meets the ear. The weather and the conditions of resonance must also be considered as well as the nature of the gas which results from the explosion. Lermoyez holds that the results are much more severe if the explosion occurs in a more or less enclosed space, such as a trench, where the force of the explosion and the gas are not quickly dissipated. The direction of the wind, and the humidity and electrical tension of the air must also be considered.

In the bursting of shells and grenades the great variations of air-pressure are the cause of the damage to the inner ear. The explosion produces a coarse mechanical effect, *i. e.*, a blow which reaches the ear before the noise of the explosion, so that, to some extent, there occurs an arrest of the stapes comparable to that produced by Gelle's experiment. Injuries to the labyrinth due to rifles being fired off close to the ear are also of a mechanical nature. During the firing of big guns the shaking of the ground is transmitted by bone-conduction to the labyrinth, though the great differences in the density and nature of the body tissues must make a bad conducting medium. Some observers say that a middle-ear lesion guards the inner ear from injury, while others hold the view that the two tympanic muscles in health act as a protection.

The Nose and Throat

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DISEASES OF THE NOSE AND THROAT.

GENERAL CONSIDERATIONS.

Histopathology of the Nose and Throat. Guggenheim[1] calls attention to the importance of knowing the fundamental pathology of ear, nose and throat diseases and to the disgraceful manner in which this subject has been neglected in the race for fees. He considers this specialty handicapped as to progress because physicians practicing it do not know pathology better. The article figures sections of angioma, cylindroma, chondroma, carcinoma, melanosarcoma, dermoid, angiofibroma, diphtheria of the pharynx, lymphosarcoma, chronic laryngitis, leukemia, cyst and papilloma.

[There is no doubt that ear, nose and throat specialists in this country are insufficiently prepared in the fundamentals of anatomy, histology and pathology, and there is no place provided for better preparation.—Ed.]

War Injuries of Ear, Nose and Throat. Prof. Barraud[2] saw a soldier in whom a bullet had traversed the head from ear to ear without causing serious injury. He also saw a "gassed" soldier who had a laryngitis with erosions and ulcerations of the laryngeal mucosa and edema of the arytenoids, followed by cicatrical stenosis of the larynx.

Traumatic frontal sinusitis was rare and complicated usually by brain injury.

Maxillary sinusitis was frequent as were injuries of the maxilla. The latter were usually accompanied by infection of the orbit.

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(1) Ann. Otolol., Rhinol. and Laryngol., March, 1917.
(2) Corr-bl. f. Schweize. Aerzte., Sept. 8, 1917.

Injuries to the interior of the nose as traumatic ozena, adhesions, and loss of smell were common.

Deafness was of several varieties; traumatic, functional and psychic.

Stenosis of the external meatus was seen.

The larynx was often fractured with stenosis following.

Headache: Its Otorhinologic Aspects. W. T. Patton[3] gives the following causes for headache: Toxic (intestinal, appendiceal, gall-bladder, prostatic, tonsillar, nasal cavities, dental, renal, aural); reflex from eyes, pressure in nose, from uterus, from irritated tooth.

He considers that the most common and most often overlooked cause of headache is pressure in the nose without any marked pathologic condition being apparent, and reports a case in which middle turbinectomy relieved the headache at once.

[We do not find pressure from anatomical variations a frequent cause for headache. We are doubtful whether headache is ever caused in this manner.—ED.]

In another case he did a window resection operation of the septum and relieved the headache. Another patient had an infection of the antrum which was relieved for twenty-four hours by washing out the pus; later the inner wall of the antrum was resected and the headache was completely relieved. Still another had the headache relieved by opening the sphenoidal sinus and washing it out. Another patient had severe headache because of chronic suppurative otitis media. In this case the patient developed a strong nystagmus to the right. Temperature was 103° F. A mastoidectomy was done on the left ear (suppurating ear) and the patient recovered.

In his sixth case he did a resection of the septum, scraped the ethmoids and opened the sphenoids. The patient was relieved for a month or two. Later the pain returned and the supraorbital nerve was injected with alcohol. Later the supraorbital and the second division of the fifth nerve were injected with only temporary relief. The supraorbital nerve was then removed and the foramen plugged with wax. The pain still con-

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(3) Laryngoscope, July, 1917.

tinued so the Gasserian ganglion was removed. Following this the patient developed a discharge from the right ear and a slight facial paralysis. Several months later mastoidectomy was done. In spite of the operation the attacks of pain continued.

[We do not recognize in this report a presentation of indications which would justify these intranasal operations.—ED.]

Importance of the Internal Secretions in Ear, Nose and Throat Affections with Special Reference to the Hypophysis. Harry L. Pollock[4] reports a patient with a hypophyseal tumor in which the roentgenogram showed a flattening out of the sella and a disappearance of the post-clinoid process.

There was complete blindness in the right eye and in the temporal half of the left. The nasal half of the field was constricted for colors. In the right eye the fundus was normal, except for a slight dilatation of the veins. In the left eye there was advancing secondary atrophy of the optic nerve.

Tolerance for sugar was increased. A preliminary left-sided middle turbinectomy and an ethmoid exenteration were done.

Nine days later the anterior wall of the antrum was removed through the canine fossa and the post-ethmoid wall was broken down and the sphenoidal cavity entered. The septum dividing the two sphenoids was broken down and the postero-superior wall of the sphenoid opened with a long electric burr. The roof was taken away exposing the hypophyseal region. No attempt was made to remove the tumor.

The patient recovered promptly from the operation, but at the time the case was reported there had been no great amount of improvement in symptoms.

Relation of the Glands of Internal Secretion to Otolaryngology. J. C. Beck[5] thinks that the glands of internal secretion have a great deal to do with atrophic rhinitis, hyperplastic sinusitis, hay fever, hyperesthetic rhinitis, asthma, deflection of septum, otosclerosis, exophthalmic goiter, myxedema, status thymicus and lym-

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(4) Laryngoscope, May, 1917.
(5) Laryngoscope, May, 1917.

phaticus, epilepsy, acromegaly, and Froehlich's syndrome.

He has treated cases of ozena using thymus, thyroid, adrenal, and hypophyseal glands in conjunction with the other treatment and thinks that he gets better results when these organic preparations are used.

In hyperplastic ethmoiditis and asthma he thinks there is a deficiency in glandular secretion because when a large dose of adrenalin is given to a patient in an attack of asthma, relief is frequently obtained.

He has administered adrenalin, thymus and pituitary extracts in otosclerosis with good results, but he does not claim that he has cured or even improved the hearing. He does claim that he has found a tendency to control the progress of the disease, however. Apparently he has had better results from the removal of foci of chronic infection, particularly from the tonsils and teeth in such cases.

Beck seems to think that disturbances in the glands of internal secretion are to blame for deviations of the septum.

[Since these deviations are not infrequently found at the third month of fetal life it is very difficult to see how their occurrence can be prevented.—Ed.]

He has found that tonsillectomy has benefited some cases of exophthalmic goiter.

Hemorrhage in Rhinolaryngologic Work. Leaving out of account the uterus, the nose is probably responsible for more spontaneous loss of blood than any other part of the body. A. M. Corwin[6] thinks the term bleeder or hemophiliac is used in a loose way to describe a vicious epistaxis or a severe postoperative hemorrhage marked by prolonged bleeding time and delayed coagulation. The term hemophiliac applies to a distinct type. He reports a case in which the patient was oozing from his gums and had numerous small ecchymoses on his legs and back in addition to severe epistaxis. The bleeding was stopped by packing the nose with coagulose on gauze and by injection of pituitrin every six hours for three doses. On the second day he was given 20 c.c. of blood serum from his brother.

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(6) Ann. Otol., Rhinol. and Laryngol., September, 1917.

Purpura is another cause of hemorrhage. Rhinolaryngologic hemorrhage, purpuric in character, occurs in scurvy, phosphorus or snake venom poisoning, grave cachexias, leukemia and anemia, and bacterial infections of many kinds. This type of bleeding is not ordinary. The blood in these cases frequently clots in the normal time. Hemorrhage from venous stasis is not common, but is seen occasionally in nose bleeding in pertussis.

Varices at the base of the tongue are rarely the site of hemorrhage, and yet their rupture may give extreme anxiety to both patient and physician unless identified.

In the real bleeder, the diagnosis is summed up in the following: Definite heredity, through unaffected females (law of Nasse). Prolonged coagulation time. Normal blood picture except leukopenia, if anything. Blood platelets not diminished, as some have reported. Origin in early youth.

We are nearly as much at sea as to why the hemophiliac loves to bleed as why normal blood loves to clot.

The most useful of all means by which we overcome pathologic hemorrhage is that product of the physiologic laboratory, the knowledge that blood serum or, under proper circumstances, whole blood introduced in the circulation stimulates clotting as it does in drawn blood. We know that animal serum injected into a seemingly hopeless hemophiliac will usually save the patient.

Corwin has used pituitrin with satisfaction in a large number of cases hemorrhage from tonsillectomy.

[We have come to rely more and more upon checking bleeding from the tonsils by searching carefully for the bleeding point and applying artery forceps.—Ed.]

The Relation of Laryngology, Rhinology and Otology to General Medicine. Francis P. Emerson[7] gives the following conditions as depending on ear, nose and throat diseases:

Ophthalmology: Retrobulbar neuritis, acute edema of the lids and congestion of the conjunctiva, pain and photophobia, iritis, infection of the tear ducts, orbital

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(7) Jour. Amer. Med. Ass'n., Sept. 15, 1917.

cellulitis, optic atrophy, ocular displacements and phlyctenular keratitis.

Skin: Impetigo, erysipelas, lupus, lepra, newgrowths from the throat, nose and ear, angioneurotic edema, lymphangioma, syphilis, tuberculosis, scrofuloderma, noma, scarlet fever, measles, erythema, urticaria, cellulitis, lichen planus, leucoplakia, keratosis, pemphigus, actinomycosis and glanders.

Orthopedics: Arthritides, acute and chronic.

Pediatrics: Syphilis, tuberculosis, newgrowths, measles, scarlet fever, Vincent's angina, streptothrix, rheumatism, endocarditis, nephritis, arthritis, bronchitis, pneumonia, abscess, mycosis, and herpes.

Ductless glands: There is no complicating factor in goiter which is more troublesome or dangerous to these patients than tonsil infections to which they are subject.

Focal Infections in the Nose and Throat. W. E. Patterson[8] considers that deep alveolar infections play the greatest part in systemic disturbances, largely due to their prevalence and absolute lack of surface drainage. Next in order come faucial tonsillar infections.

"There is one class of patients that we all have to deal with, and one that is often most neglected, the syphilitic. We are liable to overlook every other possible etiologic factor in treating such a patient's disorders; for we attribute every symptom to the syphilitic toxemia, whereas if we stop to consider that he is even more liable to have suppurative foci than the non-syphilitic patient, and should have the same careful consideration, we ofttimes would have much less difficulty in treating his disorders.

"Every patient suspected of an oral or sinus infection should have the benefit of an *x*-ray examination, a leukocyte count, and the combined judgment in many cases, of a dental surgeon and physician, and a diagnosis made by exclusion.

"The essentials in treatment of sinus infections are drainage, ventilation, evacuation of the pus, and often, where there is resultant anemia, some form of tonic treatment."

[Cases of systemic infection of focal origin should

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(8) Jour.-Lancet, Dec. 1, 1917.

be under the supervision of an internist, who determines which of the various suspected foci should be cleared up. The nose and throat specialist has too often proceeded with the enucleation of the tonsils in cases in which a general examination by an internist would have disclosed a much more probable focus which should have received attention first.—Ed.]

DISEASES OF THE NOSE.

TUMORS.

Osteoma of the Ethmoid. Dr. Coffin[1] presented a case of this disease before the New York Academy of Medicine. The growth which was very hard encroached on the orbit and could be seen in the nostril. The *x*-ray plates showed a bony growth about the size of a hen's egg, growing from the horizontal plate of the frontal bone, involving the orbit, ethmoids and nasal chamber of the left side. The patient had first noticed the growth eight years before. It started as a small hard lump just below the ridge of the eyebrow and grew slowly until the last two years.

Removal of a Large Rhinolith. D. Braden Kyle[2] reports this case.

A young man, aged 17, presented a septum markedly deflected and perforated by pressure from a body in the left nostril. This body was found to be extremely hard, almost black in color, and covered by a great quantity of mucopurulent secretion of bad odor. It was large enough to fill the entire naris; it forced the septum to the extreme right, extending into the antrum, and could be felt projecting backward into the nasopharynx. It was freely movable and not attached at any point.

The growth was removed under ether anesthesia, but it was so large that it was necessary to use rongeur forceps to break off small fragments before it could be removed. The entire operation took about an hour.

Following the operation, the patient developed a pneu-

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(1) Laryngocope, June, 1917.
(2) Ann. Otol., Rhinol. and Laryngol., March, 1917.

monic area in the left lung and had considerable emphysema of the cellular tissue at the root of the neck and below the clavicles. Later, an abscess formed at the inner canthus of the left eye. This was found to communicate with the anterior ethmoid cells. The patient recovered.

Rhinophyma Treated by Decortication and Skin Grafting. A case of this disease was presented before the New York Academy of Medicine by John J. Kernan.[3] The operation consisted of making an incision entirely about the growth, taking care to go through the skin so as to reach the full depth of the pathologic tissue. The whole was then skinned off and the entire area covered with Thiersch grafts. The wound healed nicely.

Congenital Tumor of the Fronto-Nasal Region. David M. Greigg[4] reports the case of a boy of two who had double hare-lip, cleft palate, and a pyriform tumor dependent from the left frontonasal suture. This tumor was reddish in color—was translucent, glazed and smooth and of somewhat soft consistency. It was 1½ inches long. It was removed under general anesthesia and the microscopic examination showed it to be "a congenital tumor composed of fibrous tissue, unstriped muscle, etc."

Fibroma of the Left Nasal Chamber. T. C. Worthington[5] reviews the little that is known of the etiology of nasal fibroma and states that no form of neoplasm develops and spreads with more unrelenting progress. He reports a case of fibroma in a patient aged 16 whose nose had been entirely closed on the left side for a year. He had difficulty in swallowing and a confused feeling in the head. Examination showed a tumor filling the left nasal chamber completely and protruding from the vestibule. The inferior turbinal body had been destroyed. The growth was grayish-pink in color, firm to the touch and immovable.

After several operations enough of the growth was removed so that nasal breathing was clear. Injections of trichloracetic acid failed to relieve the trouble. Under

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(3) Laryngoscope, June, 1917.
(4) Edin. Med. Jour., December, 1917.
(5) Laryngoscope, June, 1917.

x-ray treatment the growth was checked and on continuing the treatment it entirely disappeared. Ten years later there was no evidence of its return. It had apparently originated in the sphenoid.

Fibroma of the Ethmoid Region. The patient whose case is reported by R. H. Fowler[6] had a polypoid growth completely occluding the right nostril. Sections of this were reported as fibroma. Under general anesthesia, a posterior tampon was inserted and the anterior part of the growth was removed with a snare; then the tampon was removed and the growth was seized with adenoid forceps through the nasopharynx and removed in two masses, each about the size of a man's finger. There was severe hemorrhage and extreme shock at the time of operation. A large part of the ethmoid cells came away with the mass, and the ethmoid cavity was left open. A proliferation of the portions which remained behind took place about a month after the operation. To check this, several injections of trichloracetic acid were made. In the two years since the operation the patient has gained twenty pounds and his general health is excellent.

Carcinoma of the Accessory Sinuses with Intracranial Invasion—Cured Five Years. The patient, a woman of 59, was first seen by M. W. Warlow[7] in 1910, complaining of pain in the right side of the face, head, neck and in the right eye. The superior and middle meatuses on the right side were filled with a firm mass. Six months later she had seven teeth extracted without relief from the pain. She had also had an operation on the accessory sinuses on the right side and had been told that she had cancer.

There was a large opening through the canine fossa into the maxillary sinus which was discharging freely. The right inferior turbinal had been removed and all of the nasal chamber above was filled with a pinkish tissue.

The report of the microscopic examination of the tissue was given by the Woman's Hospital in Philadelphia as follows:

"A large amount of glandular tissue without malig-

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(6) Laryngoscope, December, 1917.
(7) Arch. d'Opthal., p. 449, vol. 35, No. 11.

nant degeneration; connective tissue increase and thickening of vessel walls. Not malignant."

The patient was in bad condition mentally. She was suffering so much that it was necessary to keep her tied in bed.

About a month later the carotid artery was ligated and a thorough exenteration of the ethmoidal and sphenoidal sinus was made. The growth had destroyed the roof of the sphenoidal sinus and invaded the cerebral cavity.

The patient was immediately relieved from pain by the operation. She left the hospital two or three weeks later very much improved. At present her general health is excellent. She has gained forty-five pounds. The right eye is blind. The sinus in the mouth is closed. The right naris is healthy and she has not had severe pain since her last operation. She has delusions, poor memory, is irritable and her mental condition is poor but she has been able to do her house work most of the time since the operation.

[It is difficult to see any reason for calling this report carcinoma since the laboratory examination distinctly says the tissue was not malignant and the only thing that pointed to carcinoma is the following report from another hospital:

"There was no history kept of Mrs. K.'s case; her diagnosis was carcinoma of right antrum of Highmore." —Ed.]

Surgical Removal of Nasal Papilloma Followed by X-Ray Treatment. C. E. Ide[8] reports a case of papilloma on the right side of the septum which caused complete obstruction of the right naris. There was a cauliflower growth on the anterior portion of the septum about one centimeter square, and another of similar size on the anterior extremity of the right inferior turbinate bone. A specimen showed it to be papilloma. The growths were removed with a knife, down to the bone and cartilage. Following this removal they were treated by *x*-ray under which perfect healing took place in a short time. There has been no recurrence. Ide

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(8) Laryngoscope, June, 1917.

would now advise treatment by radium rather than by the *x*-ray.

A Case of Nasal Sarcoma Cured by Radium. O. J. Stein[9] reports the case of a man, aged 20, whose right nostril was entirely blocked by a pale colored, fairly hard mass which bled freely on manipulation and apparently originated from the right ethmoid region. The diagnosis of sarcoma was confirmed by microscopic examination of tissue removed.

Stein refused to operate and the man went to a hospital where an attempt was made to remove the tumor by way of the anterior nares. Hemorrhage was severe and infection resulted. Six weeks later he again reported to Dr. Stein who at once put him on treatment by radium. One hundred milligrams were applied uninterruptedly for five hours for three consecutive days. The treatment was repeated nineteen days later, then thirty days later, and again sixty days later. A total of forty-one hundred milligram hours of radium were used about the nose. Twenty-one hundred and twenty-five milligram hours of radium were applied to the enlarged glands.

The immediate results of this treatment were brilliant. All the severe pain and the nasal hemorrhage disappeared within a week. Three months later, respiration through both nostrils was normal. On the last examination no evidence of tumor could be seen within the nose or nasopharynx. Three weeks later the man was reported ill at home with fever, pain in the abdomen, nausea, constipation, tympanitis, and a cutaneous eruption over the left half of his face. The attending physician made a diagnosis of metastasis in the intestines.

After ten days' illness the man died. At the postmortem examination no evidence of sarcoma was found in the nasal fossae, frontal sinuses, ethmoid cells, or anywhere else in the head. Examination of the abdominal cavity showed death to have occurred from perforation of the appendix which resulted in peritonitis. There was no evidence of metastasis.

In the discussion, Dr. Albert Woelfel stated that this

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(9) Ann. Otol., Rhinol. and Laryngol., September, 1917.

case was a very good example of what is known by radium users, namely, the peculiar susceptibility to the action of radium of sarcomas of the upper respiratory passage. It is thought that round cell sarcoma generally responds to the treatment more readily than other forms.

Dr. Beck spoke of a patient with a tumor of the hard palate, which on microscopic examination was found to be sarcoma. This patient was treated by massive doses of radium and the tumor had entirely disappeared in two weeks but the patient had a very severe burning of the tongue and of the soft palate from the action of the radium. This burn was very painful.

Dr. Robert Sonnenschein spoke of reporting the longest standing case of sarcoma of the nose on record. The patient lived for eleven years after the diagnosis was made. It has been shown that sarcoma of the nose is particularly benign as compared with sarcoma elsewhere.

Sarcoma of the Nose—Report of a Fatal Case, with Metastases in the Cervical Glands and in the Brain. A woman, aged 64, had a swelling on her nose for four months. When seen by J. P. Clark[10] it was about the size of a small marble. There had been a slightly bloody discharge from the nose for months. A dark purplish tumor was visible on the outer wall of the left nostril just above the vestibule. The growth was completely removed. Two months later there was an involvement of the glands of the neck. Still later the patient developed mental symptoms, incoherent talk, convulsive attacks, motor aphasia, and dysphasia. She was very drowsy at times, and at other times she was restless and irritable. Later she became very comatose and died. The autopsy showed three metastases in the brain.

In discussion of this paper Dr. Robert C. Myles expressed himself as having an optimistic feeling regarding sarcoma of the nose and accessory sinuses.

[It has seemed to me that most of the cases of sarcoma of the nose reported as cured by operation may have really been mistakes in diagnosis in which inflammatory tissue was mistaken for sarcoma.—Ed.]

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(10) Ann. Otol., Rhinol. and Laryngol., March, 1917.

Epithelioma of the Nose. Lucius Felix Herz[1] reports a case of epithelioma of the nose that was apparently caused by irritation from the pressure of tortoise shell spectacles.

[We have seen a case in which an epithelioma began to form on the bridge of the nose at the point where the rim of spectacles rested. The process was cured by *x*-ray.—Ed.]

PLASTIC SURGERY OF THE NOSE.

Rib Transplantation for Correction of External Nasal Deformity. W. Scruton[2] reports two cases:

The first patient was a girl of 17 who had a saddle nose. The Wassermann reaction was negative. Scruton made an incision across the nose at the point where the connecting bar of a pair of eyeglasses would lie when in position, and undermining the subcutaneous tissue upward and downward from this region the transplant was made. The wound healed promptly and the patient was discharged from the hospital in ten days. Five days later she returned with a swelling extending from the bridge of the nose well on to the forehead. This was incised and drained. The transplant was not disturbed and remained solidly in place.

The second patient was a young man of 22 who had nasal obstruction as the result of trauma. In doing a submucous resection of the septum to relieve the obstruction, the bridge of the nose was fractured and the external deformity was increased. A section of rib was transplanted in this case which gave the desired appearance to the nose.

Transplantation of Tibia for Nasal Deformity. Nathan P. Stauffer[3] prefers a transplant from the tibia to one from a rib because of the lesser amount of danger. He has seen the lung punctured in one case and knows of one death where a piece of rib was used.

Correction of Unlovely Noses. Julien Bourguet[4]

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(1) Med. Record, March 3, 1917.
(2) Laryngoscope, December, 1917.
(3) Penn. Med. Jour., October, 1917.
(4) Lancet, May 12, 1917.

advocates the correction of humped noses, crooked noses and depressed bridges by operation under local anesthesia and one or more incisions through the nasal mucosa. The skin is then elevated, the portion of bone or cartilage that is out of line is removed, or, in case of depressed bridge, a piece of bone from the tibia is transplanted to elevate the bridge. The scar, being inside the nasal chamber, is not visible. The article contains nothing new.

THE SEPTUM.

Corrective Surgery of the Anterior Nares. W. E. Grove[5] in an interesting article which does not readily lend itself to abstracting describes his methods of correcting a septum thickened at its anterior part, a dependent septum, a subluxated columnar cartilage and so on. The article is important to men interested in plastic surgery of the nose.

New Nasal Splints. O. J. Stein[6] has devised a nasal splint to hold cotton or gauze in contact with the septum. It is useful in the treatment of fractures of the nose, epistaxis, ulcerations, etc. The accompanying illustration shows the character of the splint (Fig. 18).

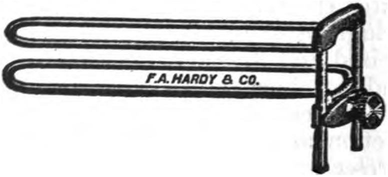

Fig. 18. Nasal splint.

Margaret F. Butler[7] has devised a splint consisting of two light plates of German silver held together by a flange attached to the front ends. They make light and uniform pressure on the septum and are comfortable to wear.

An All-Skin Incision of the Nasal Septum. C. E. Purcell[8] advises making the incision beginning at the

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(5) Wis. Med. Jour., October, 1917.
(6) Jour. Amer. Med. Ass'n., Jan. 26, 1918.
(7) Laryngoscope, June, 1917.
(8) Laryngoscope, August, 1917.

floor of the nose opposite the attachment of the inferior turbinate and carrying it forward to the tip of the nose, being sure all the while that the incision is in the cutaneous septum, and not in the mucous membrane. With this incision there is no crusting. The dissection is much harder in this region than in mucous membrane, because of the fibrous nature of the tissues. There is also more bleeding and but little anesthesia is obtained by applying cocaine to the surface. Purcell's results have been so good that he very strongly advocates this form of incision.

Septal Hemorrhage—Its Cure by Submucous Elevation. The steps of this procedure as given by John Leshure[9] are:

1. Induction of analgeso-ischemia (this term is suggested for the state which follows the local application of cocaine and epinephrine or their substitutes, and its adoption is urged as being more comprehensive than the terms generally in use).
2. Incision and elevation of the septal mucoperichondrium backward for one inch and down to the floor of the nose.
3. Compression of the elevated membrane between the blades of a special forceps.
4. Replacement of the flap and packing in the usual manner for from twelve to twenty-four hours.

Indications for operating:

Cases of septal hemorrhage which resist ordinary methods of treatment, such as cauterization, astringents, etc., and those in which no bleeding point can be readily found.

Cases of chronic crusting of the septum accompanied by bleeding.

Cases of septal hemorrhage of mild or severe degree in children who will not tolerate local treatment and who are best operated upon under general anesthesia.

The principle of cure is obviously the destruction of the thin-walled superficially placed vessels which bleed at the slightest provocation, and the ability to grasp the vessel between the blades of a forceps constitutes a distinct advantage, since pressure crushes the intima

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(9) Ann. Otol., Rhinol. and Laryngol., June, 1917.

coat of the vessel, and obliteration of its lumen is thus accomplished. The bleeding points are usually low down and anterior, consequently the incision should be placed as far forward as possible, and the elevation carried well down to the nasal floor.

The object attained by incision and elevation of the mucoperichondrium is free surgical access to the bleeding area, and the rational treatment of a bleeding vessel is compression, causing obliteration of its lumen.

Compression *en masse* with a flat-bladed forceps reaches all parts of the membrane and, if thoroughly done, results in permanent cure. It is one of the most satisfactory methods of managing cases of septal hemorrhage in children, since the operative treatment is completed at one sitting, and no prolonged after-treatment is required.

Although the number of cases reported is comparatively small, the evidence adduced by the writer and others is so favorable to this method of operation that it is confidently recommended as a routine procedure in appropriate cases.

Secondary Hemorrhage Following Six Days After Submucous Resection on the Septum. After reporting a case, D. C. Montgomery[10] concludes that a history of previous operation without complications arising does not constitute a safeguard for further operations. In other words, we should not rest in false security because of an excellent past history but should always be on guard and use all means at our command to prevent hemorrhage, and even then we are going to have a secondary hemorrhage sooner or later through no fault of our own. Secondary hemorrhage menacing the life of the patient may occur in any case of submucous resection of the septum. "Therefore, one should test the coagulation time of the blood in all cases. By so doing one will save one's self many gray hairs and an occasional patient from bleeding to death."

Traumatic Deflections of the Nasal Septum and Their Treatment. O. Orendorff[1] concludes a paper on this subject as follows:

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(10) Southern Med. Jour., January, 1918.
(1) Laryngoscope, May, 1917.

Traumatism plays a prominent rôle in septal deflections and old traumatic cases are more difficult to operate on and the difficulty increases with the duration of time since the injury.

The irritation caused by these deflections produces a stimulation of the growth of the tissues which acts as a vicious circle.

Prompt resection following a fracture is an easy procedure and affords the earliest relief and quickest recovery.

Deformity of the Septum in Children. L. G. Kaempfer[2] thinks that trauma plays a much less important part in the etiology of deviated septum than is thought by some rhinologists. He gives the statistics of 220 children examined in the dispensary of Mt. Sinai Hospital. Almost every one of these children had a high arched palate. Of the children with the low palates twelve had thickened septa and one had a deviation, so that if any significance is to be attached to a relationship between the shape of the palate and deviation of the septum it is that of cause and effect.

Kaempfer thinks that the mechanism of the vicious circle begins with a nose, one side of which is narrower than the other. A certain degree of chronic rhinitis having been established there is a tendency for the overgrowth of the adenoid vegetations and the tonsils and also for an increase in the deformity of the septum that was the original cause of the rhinitis. These conditions in their turn, tend to foster the rhinitis. The removal of any one of the factors lessens the rhinitis and benefits the patient by the absence of an aggravating element to the vicious process. The removal of the tonsils, therefore, should have a beneficial effect upon the nasal condition, aside from any other indication for their removal.

A New Method of Dealing with the Nasal Septum. John A. Cavanaugh[3] raises the mucous membrane on the convex side, then with a spokeshave removes the projecting portion of cartilage, or if the deviation is in the ethmoid plate passes one blade of a forceps blade

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(2) Laryngoscope, December, 1917.
(3) Ill. Med. Jour., September, 1917.

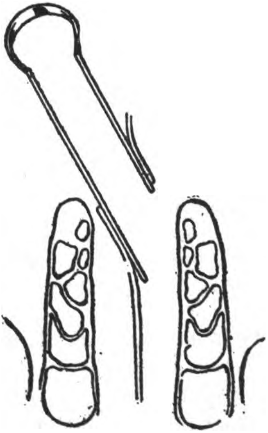
into the wound and the other blade into the opposite nostril and fractures the plate.

Deviation of the Septum and Submucous Resection. H. M. Goddard[4] says that when high deviations occur the patient is apt to complain of headache, particularly in the morning. When deviation of the septum is accompanied by ethmoid or frontal sinus disease dizziness or vertigo is apt to be present. In some cases deviation of the septum may be the reflex instigator of asthma.

He classifies septal deviations as:

1. A ridge on the septum that presses on the turbinate.
2. The same plus a convexity on the opposite side, high up.
3. Double convexity due to split septum.
4. S-shaped septum obstructing one side below and the other above.
5. High angular deviation.
6. Deviation along the crest of the vomer.
7. Abscess or hematoma.

He says: "Despite every precaution there are times when it will be impossible to avoid perforating and if this is done, it is no reflection on the operator's ability."



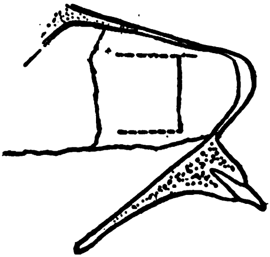


Fig. 20.

Fig. 19. Diagram showing the method of operating on the right ethmoid from the left side of the nose by making a temporary opening through the septum.

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(4) New York Med. Jour., Sept. 1, 1917.

Temporary Resection of the Septum in Operations on the Nasal Sinuses. Norman Patterson[5] makes a temporary resection of the cartilaginous septum and finds the ethmoids much easier of access. He also uses this method in operating on the frontal and maxillary sinuses (Figs. 19 and 20).

Submucous Resection of the Septum. W. E. Patterson[6] says that we must not lose sight of several contraindications to the submucous operation among which are: old age, syphilis, children under 11 or 12 years, active tuberculosis, hemophilia, diabetes, and certain stages of Bright's disease.

He uses for local anesthesia a 4 per cent. solution of cocaine in 1 to 2,000 adrenalin, using four parts of the cocaine solution to one part of the adrenalin solution. He soaks strips of gauze with this mixture and packs the strips carefully into the nasal chambers using as many as twenty strips on each side. Anesthesia is complete in twenty minutes. He prefers the semi-recumbent position. His incision begins well anteriorly upon the mucous membrane over the cartilage and about 1 cm. from the dorsum. This incision is carried well down toward the floor and thence well outward across the floor to the outer side of the vestibule. The periosteum of the floor is infiltrated with novocaine and adrenalin solution.

Nasal Deformity Due to the Submucous Operation Corrected by Transplantation of Bone. Carter[7] states that the course was submucous operation, abscess, depression of bridge. One and one-half years later he transplanted two inches of a rib with good results.

Perforation of Nasal Septum Due to Inhalation of Arsenic Trioxide. Benjamin Franklin Davis[8] reports the case of a man of 36 who ground and shoveled from 20 to 50 pounds of arsenic trioxide daily. He had none of the ordinary symptoms of arsenic poisoning but had a perforation of the cartilaginous septum 1 cm. in diameter.

Davis refers to the action of chromic salts in causing

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(5) Brit. Med. Jour., Oct. 20, 1917.
(6) Jour. Iowa State Med. Soc., January, 1917.
(7) Laryngoscope, February, 1917.
(8) Jour. Amer. Med. Ass'n., June 2, 1917.

perforations of the septum and considers that trauma of the mucosa of the septum caused by picking the nose facilitates the action of arsenic and of chromic salts.

Hemangioma of the Septum. Callison[9] reports a case of bilateral polypoid angioma of the septum. This was in the form of a number of excrescences in size from a pea down situated at the junction of the vomer and the triangular cartilage. These were pedunculated, smooth, dark red in color and bled on the slightest touch. Sections showed a tissue with large blood spaces lined with a thin layer of endothelium. Many of the vessels seemed to have smooth muscle fibers.

THE ACCESSORY SINUSES.

Diagnosis of Nasal Accessory Sinus Disease. John H. Foster[1] classifies sinus inflammation as (a) acute and (b) chronic inflammation of (1) maxillary sinus, (2) frontal sinus, (3) ethmoid cells and (4) sphenoid sinus.

Acute maxillary inflammation:

The symptoms are pain and discharge which is confirmed by puncture and lavage.

Chronic maxillary inflammation:

The symptoms are pain not usually prominent, profuse and offensive discharge.

He does not regard transillumination as of much value in the diagnosis of maxillary sinus inflammation but places more dependence on the *x*-ray picture.

Acute inflammation of the frontal sinus:

Pain is the most prominent diagnostic symptom. Edema of the upper eyelid may be present in severe cases. Transillumination is of some value but is not to be compared to the *x*-ray.

Chronic inflammation of the frontal sinus: "In some cases the *x*-ray is our only real aid."

Ethmoiditis: He regards the ethmoids as involved in any acute rhinitis of any severity. The diagnosis is confirmed by a profuse mucopurulent discharge, more or less impairment of the sense of smell, and a deep-

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(9) Laryngoscope, January, 1917.
(1) Texas State Jour. Med., February, 1917.

seated pain about the bridge of the nose. A discharge may be seen oozing from the region of the ostia.

Chronic suppurative ethmoiditis: "Patients suffering with chronic suppuration of the ethmoid cells usually come to us on account of having to hawk and spit a great deal."

Acute inflammation of the sphenoid he thinks is not usually diagnosed. Chronic inflammation of the sphenoid he regards as extremely common and as the sinus inflammation most often undiagnosed. A majority of the cases of post-nasal catarrh are due to this condition. The smooth, glazed appearance of the posterior pharyngeal wall seen in pharyngitis sicca is almost pathognomonic of sphenoidal-disease.

[Transillumination of the maxillary sinuses is very helpful. In most cases in which the antri are not involved the transillumination tests give us this information very accurately. In cases in which an antrum is involved transillumination always gives a shadow. In a few cases, because of a thick skull, we are left in doubt regarding the maxillary sinuses after making a transillumination test. In these cases, the skiagraph will assist. Transillumination is less satisfactory in diagnosing disease of the frontal sinus. This is due to the great variation in the size of this sinus in different cases and on the two sides in the same case. We have seen cases in which a small sinus, the seat of a chronic infection, appeared relatively clear on transillumination. The skiagraph is of great value in diagnosing frontal sinus disease. In the first place it gives an accurate picture of the exact size and shape of this sinus, and in the second place the skiagraph shows quite clearly the cases in which the sinus is the seat of disease. We are not able to subscribe fully to the views of the author regarding the frequency of disease of the sphenoid sinus. In the first place the examination of this sinus is much more readily carried out than in the case of most of the other sinuses. In the second place the symptom of pharyngitis sicca, referred to as indicating disease of the sphenoid, we find associated with many conditions in the nose, especially with those producing some form of nasal atrophy.—Ed.]

Frontal Sinusitis a Probable Cause of Acute Nephritis. G. F. Keiper[2] reports the following case: Male, aged 15, was very tender over the left eye and very ill about a year ago. Under treatment he made a quick recovery after the nose "broke," letting out a large amount of matter. He was perfectly well after this until his last illness.

Two weeks before his admission to the hospital the right side of his forehead was very tender to touch and pressure. His mind was confused and he had mild delirium. Pulse was 124, and his temperature was 103.2° F. Skiagraphs were negative; leukocytes, 18,400. Urine contained albumin.

The right frontal sinus was opened externally and was found full of pus. The fronto-nasal duct was occluded. This was opened and enlarged. On recovery from the anesthetic the boy became very noisy. Respiration became rapid and the pulse weak. The delirium deepened and the patient died the same afternoon. No postmortem was permitted.

Primary Epithelioma of the Frontal Sinus. Dougherty[3] reports a case in an Italian, aged 48. For a year he had had severe frontal headaches, pain in the right eye and photophobia.

It was impossible to wash out the sinuses. A probe passed into a fistula left by a previous operation met a soft resisting body. On operation, the sinus cavity was found filled with a dark granulomatous mass.

The sinus walls were necrotic; the posterior being entirely eroded with considerable dura exposed. Patient did well for several weeks when without any previous symptoms he became unconscious and died within twenty-four hours of purulent meningitis. The tissue removed at operation was found to be epithelioma.

A second case occurred in a Russian of 50. This patient had had headache and vertigo for several months and had been operated on for right frontal sinuitis. Dougherty re-operated. The tissue removed showed the growth to be squamous-celled epithelioma. Two weeks after the operation the patient had some difficulty in

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(2) Laryngoscope, May, 1917.
(3) Laryngoscope, January, 1917.

walking and the finer movements of the hand were interfered with. Two days later he had a convulsion with severe spasmodic twitching of the left side. This was followed by a total paralysis of that side and coma lasting five hours. Three days later he died. At the postmortem it was found that the epithelioma involved the frontal lobe.

[Cases of malignant disease of the nasal accessory sinuses are not rare. Operation gives but little relief. In one case observed by us the disease took its origin in the maxillary sinus. The histologic diagnosis was that of a round-celled sarcoma. The possibility of syphilis seemed to be excluded by a negative Wassermann and failure to respond to administration of iodides. The patient left the hospital. We have since heard indirectly that she has made a spontaneous recovery.—Ed.]

Treatment of Frontal Sinus Suppuration. Lothrop[4] says that sinus inflammation may be cured by drainage and by obliteration of the cavity. Irrigation of the frontal sinus he regards as of but little value.

He amputates the anterior portion of the middle turbinate as a preliminary, then breaks down the anterior ethmoid cells.

Where this does not suffice he does an external operation in chronic cases, making the skin incision medial to the supra orbital nerve which he avoids. The opening into the sinus is made by chisels and enlarged by forceps until it is about ¾ of an inch long. The sinus is cleared of pus, polypi and granulations and the floor anterior to the infundibulum is broken down, chiefly by burrs and rasps introduced through the nose while their position is watched from above. When the floor is thus destroyed and as much of the thickened solid mass of bone formed by the junction of nasal and frontal bones removed as possible, the septum between the two frontal sinuses is broken down and the perpendicular plate of the ethmoid below so that there is free communication between both sinuses and a large drainage opening below into both nostrils. The skin wound over the sinus is closed at once.

The results have been excellent. The scar should be

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(4) Laryngoscope, January, 1917.

scarcely noticeable. No deformity results because the opening into the sinus is too small to permit depression following.

[The indications for external operation on the frontal sinuses are very much more restricted than was recognized a decade or two ago, when the Killian operation was being done extensively. Intranasal surgery carefully carried out by a competent rhinologist cures more of the cases, even of chronic empyema of the frontal sinuses. Of the cases which are not entirely cured by this method, the symptoms of discomfort and pain are as a rule relieved, and the possibility of an intracranial complication from retention of pus obviated. The cases in which the resort to an external operation is warranted include especially cases in which symptoms of a beginning intracranial complication exist, or in which the pain and discomfort are not relieved by intracranial work. These cases are in our experience very exceptional.—Ed.]

Operative Treatment of Chronic Frontal Sinusitis. T. W. Moore[5] concludes his article as follows:

"1. I believe that in the Lothrop operation we have all the advantages of the various intranasal operations, with practically none of their dangers, because we are able to see each step of the work. In addition, none of the intranasal methods removes the floor of both sinuses so completely as this.

"2. The technique is simple and the operation is easily .performed.

"3. The cosmetic effect is excellent, there being practically no scarring.

"4. The very little after-treatment makes it particularly applicable to those patients who are so situated that they can not undergo prolonged after-treatment in skilled hands.

"5. The results are very satisfactory. The symptoms, especially pain and increased secretion, disappear."

[Can hardly subscribe to all of these conclusions. The cosmetic effect is a serious objection, especially in the larger types of frontal sinus, an anatomic variation quite as common as the extremely small sinus. The

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(5) Southern Med. Jour., February, 1917.

intranasal operation requires no more care, and usually not so much, as does the external operation.—Ed.]

Accessory Sinuitis. M. E. Taber[6] is struck by the existence among the specialists in rhinology of men who represent former stages in the development before the art had reached its present position *i. e.,* who are immature. Timidity influences some, ignorance and lack of experience others.

[One of the great needs in this country is some adequate method of standardizing the preparation of physicians taking up work in the special fields. The need is now pretty generally recognized and we may hope for its solution in the near future.—Ed.]

Intranasal Drainage of the Frontal Sinus. E. Fletcher Ingals[7] after referring to the intranasal drainage of the frontal sinus from the time of Ogston in 1884, who declared that there was no possibility of introducing a probe into the frontal sinus from the naris, down to the present time, described in detail the operation as he performed it.

The essential instruments for his operation are fine steel bent probes, 14.3 cm. in length by 0.6 millimeters to 1.5 millimeters in diameter, that are introduced, with the aid of a removable handle, through the naso-frontal duct into the frontal sinus; a perforated (or bead-like) burr, that is run in over this probe to make a drainage canal of adequate size, and a spring-gold self-retaining tube, to maintain the lumen of this canal until it has become covered with mucous membrane.

A similar tube as large as the canal made by the operation would, he thought, be a great help in the subsequent treatment in all of the other practicable intranasal operations. This tube not only prevents closure of the canal, but it is a great help to the patient in washing out the frontal sinus, which can be done every day after the operation by the patient himself. With the Eustachian tube catheter that Ingals gave the patient for washing out the sinus he can readily locate the metal drainage tube and irrigate the sinus without pain.

Ingals first attached a silver canula 1.5 millimeters in

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(6) Texas State Jour. Med., February, 1918.
(7) Ann. Otol., Rhinol. and Laryngol., September, 1917.

diameter to a 2 dram syringe, and passed it as far as possible into the naso-frontal duct, the lower orifice of which is immediately behind the uncinate process and external to the anterior end of the middle turbinated body. This canula is ten centimeters long, and in order to allow it to adapt itself to the sometimes tortuous frontal sinus, three centimeters of its distal end is of soft silver. In order to avoid pain and to remove swelling the syringe is charged with 10 per cent. of cocaine in 1 to 4,000 of epinephrine, and as the canula is introduced about 1 minim of this solution is forced through it, about every two minutes, three or four times. In the great majority of cases the canula may after a few minutes be carried on into the frontal sinus, but sometimes the enlarged agger cells that occupy the upper part of the uncinate process obstruct the passage, and in other cases the canula passes into a fronto-ethmoid cell and it is not possible to follow the naso-frontal canal; however, the region has thus been anesthetized and the swelling reduced. Then Ingals tried the steel probes and altered the curve as seemed indicated by the direction the silver canula had taken. If in the adult the end of this probe could not be passed more than 5.2 cm. from the posterior inner angle of the nostril, he knew that it had not gone into the frontal sinus. When it passed into the sinus, the end of a probe bent from thirty to fifty degrees will be 6 or 7 cm. from the point indicated.

In order to avoid all danger, frontal and lateral skiagrams should be taken with the probe *in situ,* and thus one may be certain whether or not it is safe to enlarge the canal to a diameter of 6 millimeters. Ingals examined a great number of anatomic specimens with this point in view, and saw only one where the burr could not have been passed with perfect safety. In that one the naso-frontal duct ran so close to the olfactory groove that almost any operation, either internal or external, to establish drainage would have opened into this groove.

In all cases, the anterior third of the middle turbinated body should be removed before the operation. This allows more freedom of motion. Ingals did the operation two or three times without this procedure, but regretted it, as swelling of this tissue is apt to interfere with free drainage and with irrigation. If possible the frontal sinus should be well washed out before the operation is done. After the safety of the operation has been proved by the skiagram, with the probe in position, the naso-frontal duct and the frontal sinus are anesthetized by injecting into the sinus about 1 dram of 5 per cent. cocaine in 1 to 4,000 of epinephrine. The whole naris is then thoroughly swabbed with vaseline. The probe, which should be of a length to project 4 or 5 millimeters beyond the burr when the latter has been passed over it to the farthest extent, is then introduced and its handle removed. The shank of the burr is then attached to the chuck of the dental engine, and the perforated burr with the spiral metal tube over its shank is slipped over the probe and pressed up to the roof of the naris. The current is then turned on, slight pressure is made, and in a second or two the frontal sinus has been opened. Ingals usually passed the burr up and down a couple of times to clear the opening of any obstructing mucous membrane; then the operation is finished except what might be termed the dressing.

In any of these intranasal operations it is important to caution the patient not to blow the nose, because of the danger of forcing air and septic material into the orbit or subcutaneous cellular tissue.

In this operation there is very little blood, so that the field of operation is not obscured. When there appears to be any danger of injuring the posterior wall of the frontal sinus, a strong thread is fastened to the distal end of the spiral tube and kept from slipping by a narrow strip of adhesive plaster, and when the burr has been passed up to the roof of the naris, strong traction is made on this thread so as to draw it and the burr forward. When this is done, or when the probe has had to be bent more than usual, the enlarged canal has a curve that may not admit the other instruments or the gold tube, therefore, in such cases, as soon as the burr has been withdrawn, Ingals introduced another probe with the normal curve, and then ran the burr in again. He once devised a shield to use in such cases, and came to think this simple method better.

In cases in which the end of the probe had been caught in a fronto-ethmoid cell or stopped by the upper end of the processus uncinatus, he passed it in as far as practicable and then ran in the burr, after which he never found any difficulty in passing the probe into the frontal sinus and completing the operation.

When the burr was removed he passed in the bent tube packer, through which he introduced the end of a yard of a half-inch strip of gauze, about a foot of which has been saturated with a liquid formed by rubbing together equal parts of camphor and phenol. This is a powerful antiseptic but not an escharotic. It is pushed on into the frontal sinus and allowed to remain about five minutes. The packer tube is then drawn down about half an inch so as to expose the raw surface caused by the burr, and the gauze is slowly withdrawn, thus practically searing the raw surface so as to prevent absorption of the pus that will for some time flow down the frontal sinus.

Following the operation, a gold tube with one end slit into several leaves which are sprung outward, is introduced into the frontal sinus through the opening made at operation. After the ends of the leaves had been brought together within a gelatin capsule and after the tube is introduced, a small steel probe is passed through it to punch a hole in or push off the gelatin capsule, which will dissolve in three or four minutes. The gold springs at once spread out and hold the drainage tube in position. The drainage tube should be left in three or four months.

Ingals believed his operation the safest and that it would prove efficient in nearly all chronic cases.

In a large percentage of acute cases the application of heat externally, and especially by the Bruenings head-light bath with frequent applications of epinephrine and cocaine will reduce the swelling so as to avoid the necessity of any operation.

The article is accompanied by illustrations showing the instruments used, with position of probes and tube in the nasal frontal duct, and the method of using the Bruenings head-light bath.

Frontal Sinusitis with Intracranial Involvement. Charles L. Stone[8] reports the case of a female patient aged 32 who had had a frontal sinusitis following a head cold. She had had the ordinary symptoms of a frontal sinusitis, then the headache increased, she became dull and apathetic and later had a convulsion. Temperature and pulse were but slightly elevated. There was edema of the left upper eyelid, swelling and redness of left middle turbinate, pus in the region of the naso-frontal duct, and tenderness on pressure over the floor of the frontal sinus.

A radical (Killian's) frontal sinus operation was done immediately. Cerebrospinal fluid was clear and under slight increase of pressure. There was a leukocytosis of 24,000. The morning after the operation she had another convulsion, two days later two more convulsions occurred and occasional intracranial exploration with the revelation of a dull gray, sloughy looking dura which did not pulsate. Considerable exudate was found outside the dura. Drainage was followed by cure.

Brain Abscess from Chronic Suppuration of the Frontal Sinus. T. P. Berens[9] reports a case of this sort in a man, aged 32, who had had a radical external operation on the frontal and sphenoidal sinuses, together with opening of the antrum of Highmore through the naso-antral wall. Convalescence was slow.

Three years later, there was a large swelling of the cicatrix in the right frontal region accompanied by headache. The old wound was opened and much pus escaped. Granulations in the roof of the frontal sinus hid a perforation which led to a cavity two and one-eighth inches from the roof of the sinus. The opening into this cavity was gently enlarged, and a horse-hair drain placed therein. Later a soft rubber drain was inserted. The discharge lasted for five weeks and the wound was not allowed to heal for several weeks thereafter.

Recovery was complete except that there was considerable discharge of pus from the left nostril.

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(8) Long Island Med. Jour., November, 1917.
(9) Ann. Otol., Rhinol. and Laryngol., March, 1917.

Empyema of the Left Ethmoid and Frontal Sinus with Perforation of the Inner Wall of the Orbit. E. R. Roberts and T. J. Harris[10] report the case of a boy of 16 who complained of pain and swelling in the region of the left eye. He had acute rhinitis, with pus in the nares. His temperature was 104.6° F. His illness had begun three days previously. The first symptoms were pain about the left eye and over the frontal sinus. On the fourth day of his illness an external operation was done through the left eyebrow. About one and one-half ounces of thin yellow serous fluid escaped. The incision was carried to a point one-fourth inch from the midline of the nose, and another incision one inch long carried upward at right angles from its inner end. The subcutaneous tissues were fully an inch in thickness. Removal of the anterior wall of the frontal sinus showed the sinus to be full of pus. The second incision was then carried downward midway between the inner canthus of the eye and the midline of the head to a point opposite the floor of the orbit and the periosteum on the nasal side and orbit side was elevated, disclosing an orbital perforation leading to the anterior ethmoid cells. This opening was enlarged and the ethmoid labyrinth completely exenterated by the nasal route. The frontal sinus was packed, a drain inserted into the nose through the orbital opening, and the wound partly closed by sutures. Uninterrupted recovery followed. The *Staphylococcus aureus* was isolated from the pus and was the cause of the infection.

Sciatica from Ethmoiditis. J. A. Thompson[1] reports the case of a woman, aged 35 years, who had an attack of sciatica which confined her to bed most of the time. Roentgen-ray examination of the joints, teeth, and sinuses was negative. Her temperature varied from 90° to 100° F. The tonsils were normal, as was the nasal mucosa, except that the right bulla ethmoidalis did not blanch when the adrenalin spray was used to shrink the tissues. A little pressure on the congested area with a cotton-wrapped probe was sufficient to break through the cell wall and permit the escape of a few drops of pus.

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(10) Laryngoscope, February, 1918.
(1) Laryngoscope, August, 1917.

Three days later the patient reported that she had neither pain nor fever. Later all her symptoms returned upon which Thompson resected the right middle turbinate and opened the bulla freely. The patient recovered completely and went to work in ten days.

Asthma Associated with Ethmoidal Disease. According to J. MacK. Brown,[2] nasal lesions producing asthma are nearly all of ethmoidal origin, and a more or less complete ethmoidal exenteration results in cure or in great improvement of the asthma. Fibrous masses, ulcerations, and a general thickening of the mucous membrane have been observed on bronchoscopic examinations. The accepted theory at present is that the symptoms are due to a spasm of the bronchial musculature, and that there undoubtedly is an edema of the mucous membrane, but that this is secondary. It has been shown that anaphylatic shock can produce symptoms much resembling an attack of asthma.

In all of Brown's cases there was demonstrable some involvement of the ethmoids. Five of his patients had suppurative ethmoiditis. There must be some underlying factor in these cases of ethmoiditis that will produce asthma, and Brown believes this to be the neurotic state of the individual. He mentions a woman whose asthma had always been relieved when she went to a certain resort. While enjoying perfect health at this resort she received a letter containing bad news, and was immediately seized with a violent asthmatic attack which lasted for several hours.

Brown's paper is based on twenty-seven cases in which exenteration of the diseased ethmoid labyrinth was done. These patients were great sufferers, and many of them had gone through the list of asthma remedies with nothing more than temporary relief. Their ages ranged from 4 to 62 years. There was a marked deviation of the septum in thirteen cases. The antrum was involved in three, the frontal sinus in two cases, and the sphenoid in two. Twenty-two had hypertrophic ethmoiditis, with no demonstrable pus, and five had suppurative ethmoiditis.

The treatment consisted in as complete an exenteration

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(2) Ann. Otol., Rhinol. and Laryngol., June, 1917.

of the ethmoids as possible, according to the nature of the pathologic lesions. Brown is convinced from his observations on these patients that hypertrophic ethmoiditis is a distinct etiologic factor in the production of asthma.

[We concur in the views here expressed.—Ed.]

A Surgical Consideration of the Upper Paranasal Cells. For surgical purposes G. Sluder[3] thinks that cells may advantageously be thought of as upper and lower, the latter being the antrum of Highmore, the former being the remaining cells. This subdivision establishes a horizontal dividing line on the lateral wall at about its middle. Successful surgery of the antrum must leave a drain at the level of the nasal floor. The lowermost part of the upper cells is along the line separating them from the antrum. Successful surgery of the upper sinuses is not achieved by a drain along this line, for the reason that there are usually cells that are limited to a part far above the midline. Successful surgery of the upper sinuses must lay open for drainage the upper cells in their entirety, beginning at or very close to the cribriform plate of the ethmoid.

[We do not concur in the view that successful surgery of the antrum must leave a drain at the level of the nasal floor. We have found that the important thing to do is to secure a large intranasal opening. We have just as good results with this in the middle as in the inferior meatus. In most cases, we prefer the middle meatus because a large opening can be more easily made in this locality.—Ed.]

In the conservative operation, the middle turbinate and the innermost layer of the capsule of the ethmoid are removed. The radical operation consists in removing the capsule "part and parcel," including the orbital plate, when desirable for drainage of the orbit into the nose.

Sluder says that Ballenger's ethmoidal exenteration does not open the ethmoidal cells anterior to the uncinate process. The uncinate process is usually, if not always, too hard to be cut by Ballenger's knife. Sluder operates with a special knife which he has devised consisting of

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(3) Ann. Otol., Rhinol. and Laryngol., June, 1917.

a handle, a shaft and a cutting end turned at a right angle to the shaft and sharpened so as to cut on the inside of the right angle. This knife possesses great strength, but is so small that it readily enters spaces which larger knives could not enter.

He introduces the knife under the anterior third of the middle turbinate as far back as the uncinate process, and as high as possible, with its cutting edge facing forward. It is then rotated somewhat inward and drawn forward and downward. In this way the foremost and uppermost nasal wall of the capsule of the ethmoid (with the attachment of the middle turbinate) is cut open and the prefrontal cells of the ethmoid are thereby thrown open. By this means the frontal sinus is well open to the size of the infundibulum—*i.e.*, 1 cm. antero-posteriorly and 0.5 cm. laterally. By a down pull the floor of the anterior part of the frontal sinus. A rasp may then be introduced and the opening into the frontal sinus enlarged.

For the ethmoidal region, the knife is re-introduced along the cribriform plate with its rounded edge upward to a distance of 1 cm. It is then rotated until its cutting edge points outward and slightly upward and is then pulled forward. Two or three similar incisions are made.

The cutting edge of the knife is now turned downward, or downward and slightly outward. The mass is then detached so that a snare may be put around it and cut it from its attachments.

After this, the sphenoidal and post-ethmoidal cells also need operation. The knife is passed gently backward along the cribriform plate, with its cutting edge downward, until it meets the anterior face of the body of the sphenoid. Gentle pressure is now made on the face of the sphenoid and the knife inclined slightly toward the septum. The first stroke perforates the sphenoidal face and cuts somewhat downward. The knife, with the cuting edge downward, is then introduced very gently into the opening and passed as far back as the cells permit. It is rotated fifteen degrees inward, and drawn downward with any degree of force that may be needed. Should this incision not have reached the floor of the sphenoid, another similar one usually does. The knife, with the edge down, is again passed along the cribriform plate and very carefully introduced back into the uppermost limit of the opening already made. It is then rotated thirty degrees outward and brought out forward and downward. This incision includes a considerable part of the wall separating the postethmoidal from the sphenoidal cell and usually takes the postethmoidal nasal wall as well as most of the lateral part of the sphenoidal face.

The mass is then removed in one piece by the Knight forceps. The knife used in the second part of the operation is smaller than the knife used for the first part. It has a cutting edge 1.5 millimeters long.

Too large a knife has the disadvantages of taking up space unnecessarily and of biting more bone than it can cut, and possibly of cutting inadvertently into the orbit, and of being much more apt to break.

The intranasal surgery of the upper cells may be performed by this method in any part or the whole as conservatively or as radically as desired.

The entire performance may be accomplished within a short time. Sluder has often finished the high frontal ethmoidal and sphenoidal combined operations in two minutes.

The Relations of the Sphenoid Sinus to the Semilunar (Gasserian) Ganglion and Their Possible Clinical Importance. G. Sluder[4] thinks that the close relation of the sphenoidal sinus to the Gasserian ganglion offers an explanation of the herpes which develops in the wake of sphenoidal infections, or which arise in some patients from ordinary coryzas, and explains why semilunar ganglion neuralgias and tic douloureaux of sphenoidal origin sometimes recover as a more or less acute or subacute lesion, and at other times require a ganglion removal or a posterior root section.

The article is accompanied by two illustrations of the relations between the ganglion and the sphenoidal sinus.

Infection of the Sphenoidal Sinus. E. M. Sykes[5] reports several cases of infection of the sphenoidal sinus

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(4) Ibid.
(5) Texas State Jour. Med., October, 1917.

in which the symptoms were headaches, sore eyeballs, blurred vision, post-nasal dropping, etc., and concludes that all patients with obstinate headache not responding to general treatment should have a nasal examination. He seems to have had but little aid from *x*-ray examination.

[The nose should always be examined in case of headache, not after the general treatment, but before beginning treatment.—Ed.]

Suppuration of the Accessory Sinuses in the Nose. E. B. Gleason's[6] idea of the treatment of suppuration of the accessory sinuses formerly leaned toward a complete exenteration by a radical operation, but now he uses suction and believes that any apparatus that will quickly produce a partial vacuum within the nose will answer a good purpose. Before using the apparatus 2 per cent. cocaine solution is applied to the parts about the openings of the sinuses from which it is desired to remove secretions in order to remove any swelling that might obstruct these openings. Following the use of the pump, 10 per cent. argyrol solution is injected into these localities with a long-nozzled hypodermic syringe. If the apparatus shows the amount of negative pressure to be over twenty inches of mercury it is often painful and usually causes hemorrhage. The use of a suction apparatus produces two results. It empties the sinus of mucous or pus. Hyperemia is best secured by maintaining the suction steadily for ten or fifteen minutes. He considers that nasal polypi are not so apt to recur if after their removal suction is used at intervals of two or three days for a time. Gleason reports several cases of sinus suppuration treated by this method with excellent results.

[Suction treatment does not cure cases of chronic empyema. On the other hand, complete exenteration by the radical operation is not indicated in most cases.—Ed.]

Epidemic Nasal Sinusitis: "Influenza" and "Gripppe" Its Misnomers. John J. Hurley[7] in an article of protest points out that epidemics of so-called influenza are

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(6) Laryngoscope, January, 1918.
(7) Med. Record, May 26, 1917.

in reality epidemics of sinus infection and suggests that attacks of so-called acidosis in children are often sinus infections, and that because of imperfectly closed sutures grave constitutional symptoms promptly appear and overshadow the symptoms ordinarily indicative of sinus inflammation.

Relations of Disease of the Accessory Sinuses to Diseases of the Eye, Especially in Children. J. H. Bryan[8] reports three cases:

Case 1.—A child of 18 months had marked exophthalmos on the left side following an infection from influenza.

The diagnosis of orbital abscess resulting from an infection through the ethmoid cells was made.

A radical operation was done. The whole inner wall of the orbit was removed as far back as the sphenoid. The middle and posterior portions of the ethmoid cells were found to be badly diseased and from the condition found it was apparent that the orbital abscess resulted from a direct infection from the ethmoid cells.

The child made an uninterrupted and quick recovery.

Case 2.—A negro boy, aged 11 years, had bulging of the left eye downward and outward to a marked degree. No pus was to be seen in the nose and no signs of caries or necrosis.

X-ray examination showed no abnormality except that the left orbital cavity was apparently filled with a dense mass which seemed confined to the orbit.

An exploration of the orbit showed a decided bulging of the ethmoid toward the orbit. The ethmoid cells were broken open and a large quantity of pus was evacuated. The whole of the inner wall of the orbit, including all the ethmoid cells, were removed as far back as the sphenoid, and in doing so a large abscess was found in the sphenoidal sinus. All diseased bone and pus were thoroughly removed, and an iodoform gauze packing was placed in the sphenoid and ethmoid regions. At the end of the second day the gauze was removed.

The patient made a quick recovery.

Case 3.—A man, aged 36, had thrombosis of the cavernous sinuses. Under ether anesthesia he removed the

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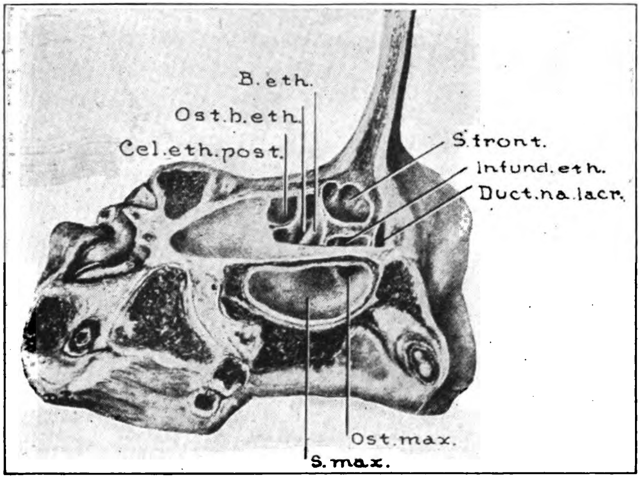
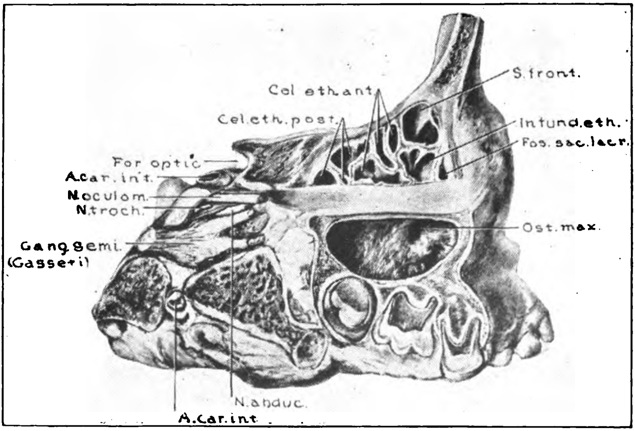
(8) Ann. Otol., Rhinol. and Laryngol., March, 1917.

PLATE X.



From a child 4 months and 27 days old (after W. Davis).



From a child 1 year and 4 months old (after W. Davis).—Rose Hall Skillern, page 305.

middle turbinals and opened both sphenoidal sinuses, finding some mucopurulent secretion in both cavities. The condition of the patient grew rapidly worse and he died.

[We have seen several cases in children where an abscess of the orbit developed about the region of the inner canthus, caused by an acute infection of the ethmoid. We have had good results by simple incision and drainage of abscess, without resorting to an operation on ethmoid.—ED.]

Sinusitus in Children. Ross Hall Skillern[9] arbitrarily gives 5 years as the dividing line between infancy and childhood. In the infant, the ethmoid sinuses are the only ones well developed. The cells are perfect and of the usual number. The true sinuses develop from the ethoid cells. The antrum develops first and enlarges rapidly (Plate X). Under the age of 2, the sphenoid is but an indentation and the frontal has not yet made its appearance. The transitional stage of the frontal and sphenoid sinuses is from 2 to 6 years. After the sixth year, the sinuses have become well-developed and occupy their permanent positions in relation to the surrounding structures.

When infants under 2 years of age acquire sinusitis it always attacks the tissues as a whole rather than confines itself to the maxillary sinus or ethmoid cells. These cases are unusually severe, for the infection attacks not only the mucosa but the underlying soft spongy bone so that almost the whole side of the nose and often the face is affected. The disease shows a tendency to point and rupture externally either above or below the orbit. If seen early a thorough endonasal curetting may prevent the formation of an external fistula and eventually bring about a cure.

In children over 5 years of age the affection when not due to scarlet fever or diphtheria is a little different. It begins as a common cold in the head and continues until a sinusitis develops as in the adult.

In the diagnosis adenoids with post-nasal discharge or infected nasopharyngeal adenoid tissue must be con-

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(9) Jour. Amer. Med. Ass'n., Sept. 15, 1917.

sidered. Transillumination is positively misleading and worthless. The Roentgen ray is of positive assistance.

Skillern uses in the treatment calomel if seen early, cleansing douches, vaccines in some cases and surgical means. The indications for surgical treatment are clear: A deformed face from a sinus about to rupture, exophthalmos, swelling of the lids, edema and redness. Conservative operations are of no avail. "Do not make large external openings. The bulk of the work should be intranasal." The Luc-Caldwell or other operation through the canine fossa is apt to injure the tooth germs.

Kenneth A. Phelps[1] says: "Even today it is apparently considered unimportant, for it is barely mentioned or not mentioned at all in the standard works on pediatrics, rhinology, or pathology, and even those books devoted exclusively to the nasal accessory sinuses give little space to sinusitis in children."

Haike examined sixty-four children post-mortem and found fifty-four with a sinus disease. From a study of about 300 *x*-ray plates, together with some actual dissections of children's sinuses, it may be stated that the sinuses are probably more variable than any other structure in the body.

Phelps says:

"I have seen large frontal sinuses in a child of 5 years, and Haike has reported a case as early as 2½." The full development is not reached until the age of fifteen to eighteen years.

Etiology: One case followed bathing; four cases followed coryza, two scarlet fever, one case each measles, typhoid, pneumonia and influenza; four cases came on suddenly over night; one case followed tonsillectomy and one extraction of a tooth. Most of the cases reported have followed scarlet fever. Ruedi found sinusitis to occur in 8 per cent. of 750 cases of scarlet fever studied by him. Sinusitis may occur at any age. Morgan reports a case at birth. Of the thirty-five cases in Phelps' report two children had meningitis; three had orbital abscesses; two had orbital cellulitis without pus; five had swelling of the lids; one had abscess of the lower

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(1) New York Med. Jour., Sept. 22, 1917.

lid; one had swelling between the eyebrows; one a cheek abscess and two suffered from acute otitis media. He says:

"I believe that if every child who suffers from a meningitis, asthma, nephritis, arthritis, endocarditis, or headaches and in whom the etiology is obscure, as well as those suffering from frequent or long-standing coryzas, frequent tonsillitis, bronchitis or laryngitis, were carefully examined for a sinus infection the relation above mentioned might be more frequently established."

[A valuable article. Should be studied by everyone doing nose and throat work.—Ed.]

Osteomyelitis of the Sinuses Following Scarlatina. Lynch's[2] patient was a girl of 13. She had scarlatina and ethmoiditis. Later she had an abscess of the septum and ulceration of the cornea, also peritonsillar abscess. The *x*-ray showed that all the sinuses on the left side were involved. The ethmoid and frontal sinuses were subjected to the external operation. The anterior wall of the frontal sinus was found necrotic; the orbital wall of the antrum was likewise necrotic.

A second operation was done later and the dura found bare in an area 3 cm. in diameter. The final result was a saddleback nose and loss of the eye.

The Medical Treatment of Sinus Disease. G. B. Wood[3] says that acute inflammatory disease of the accessory sinus rarely calls for surgery, whereas chronic empyema seldom recovers without surgical help.

Sinusitis as a complication of grippe or other serious systemic infections is of more serious import, as a rule, than that following a simple coryza. He recommends atropine in small doses at frequent intervals to lessen secretion, and potassium iodide when the secretions are thick and tenacious. Hexamethylenamine in large doses at times seems to abort an attack. Hot or cold external applications often give relief. Local astringents like cocaine and adrenalin are useful. Vaccine therapy is of doubtful value.

[Surgery should be employed only in the exceptional cases of acute sinus disease.—Ed.]

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(2) Laryngoscope, March, 1917.
(3) Therap. Gaz., June, 1917.

Non-Surgical Treatment of Inflammation of the Nasal Accessory Sinuses. W. A. Wells[4] divides the local treatment of inflammation of the accessory sinuses into: (1) measures applied to the nasal passages; and (2) measures applied directly to the sinus cavities. Under the first he places measures that aim to keep the ostia of communication between the nose and the sinuses open so that ventilation and drainage shall be unimpeded. For this purpose he suggests warm saline solution as being effective. Another method of removal is by means of steam inhalation.

When obstruction is due to acute inflammatory swelling, it is allowable to use powerful acting astringents such as cocaine and adrenalin. The application should be limited to the region of the ostia which for the anterior cells is in the hiatus semilunaris: for the posterior, in the superior meatus. Under the direct treatment of the sinus cavity he would place irrigations when such are possible. Another means that is much used is suction.

Wells has used with considerable satisfaction an apparatus devised by Dr. Louis Coffin whereby he can change suddenly from negative to positive pressure and *vice versa.* By means of this apparatus he has been able in many cases to apply treatment directly to the sinus cavity.

For this purpose he has used two formulas: one containing camphor-menthol, and the other camphorated phenol in a 10 per cent. preparation of iodine. He believes that if non-surgical treatment is used many patients will recover who otherwise would require operation, and he is convinced that operations are too frequently done on the accessory sinuses.

Complications of Accessory Sinus Disease. W. P. Breath[5] states that it is surprising that the complications of sinus disease are not more common considering the close proximity of the accessory sinuses to the orbital cavity, optic nerve and adnexa, meninges and brain. Dehiscences, either congenital or acquired, frequently exist and it must be remembered that the ethmoid veins

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(4) Laryngoscope, May, 1917.
(5) Texas State Jour. Med., February, 1917.

and arteries course intracranially for some little distance; the veins and lymphatics of the nasal mucosa and dura communicate and the supra-orbital, frontal and ethmoid veins empty into the ophthalmic vein. Veins from the ethmoid empty into the superior, sometimes the inferior ophthalmic vein and anastomose with the veins of the dura; those of the frontal anastomose with the longitudinal sinus; those of the sphenoid with the cavernous sinus. The nerves come in also for their share in the transmission of infection along their sheaths.

Complications may be due to mechanical pressure, infection or toxemia. Infection, however, plays the more important rôle in causing the complications which take place in accessory sinus disease.

Fatal Case of Membranous Infection of the Nose and Antrum. A. S. Kaufman[6] reports the case of a man, 30 years old, who had what appeared to be influenza from the effects of which he was quite ill. The left side of the nose was much obstructed by false membrane. Cultures were made from this with negative results as to diphtheria. Transillumination showed the antrum to be involved, but although it was washed no fluid was obtained. The man's temperature became septic. There was some paralysis of the muscles of the left side of the face. Urinalysis showed albumin, some pus, many granular and a few leukocytic casts.

A pre-turbinal opening was made into the antrum which was found to be completely filled with false membrane.

The laboratory examination showed necrotic tissue consisting of poorly stained masses of fibrin, cells and granular debris. Cultures of pneumococci were obtained. Later an abscess formed on the left side of the neck and was opened and drained. Still later, a similar abscess appeared on the right side of the neck.

Facial paralysis did not clear up, and in addition the muscles of deglutition became involved, rendering swallowing impossible and necessitating feeding through a tube. The man died forty-eight days after operation.

[The history of severe illness, false membrane, and

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(6) Laryngoscope, June, 1917.
(7) Laryngoscope, June, 1917.

paralysis of face and throat would seem to point very strongly toward diphtheria in spite of the negative cultures.—ED.]

HAY FEVER.

Treatment of Hay Fever. Newell S. Ferry.[8] While several methods of desensitizing an individual against a foreign protein have been suggested, the most promising, as regards the pollen protein, seems to be by the subcutaneous route. Ferry's conclusions are: When single extracts are used and proper precautions taken, pollen extracts give us one of the most scientific methods of treatment known to medicine. The reasons are these: the diagnosis can be made, the exact dose calculated, and the resistance of the patient determined before, during and after the period of treatment.

Seventy-one per cent. of patients are relieved of practically all symptoms and at least 16 per cent. more are more or less benefited.

Hay Fever as a Neurosis. J. S. Fraser,[9] after an extended description of the nervous mechanism of the nose, reviews the recent work on hay fever. Treatment he considers under the heads of passive immunization and active immunization. The former may be attempted by injecting a single large dose of blood serum from a rabbit that has had large quantities of pollen injected at regular intervals for about 5 months.

Active immunization is attempted by injection of minute quantities of the water-soluble portions of pollen that has been ground with sand in a mortar; 1/1000000 gm. of dry pollen is a "pollen unit." It is safe to begin the dose with one or two "pollen units," after which the dose is gradually increased to 1000 pollen units. Different observers report varying percentages of cure or improvement. At present, active immunization may be regarded as a promising method of treatment.

He discusses ingestion anaphylaxis affecting the respiratory tract, such as is induced by proteids found in fish, milk, horses, eggs, etc. He considers Auld's treat-

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(8) Interstate Med. Jour., April, 1917.
(9) Edin. Med. Jour., August, 1917.

ment of this form of asthma by the injection of watery solutions of peptone as very promising.

He quotes Cocks' conclusion that the theory of bacterial infections as the sole cause of catarrhal inflammation of the upper air-passages is not tenable.

[The neurotic element in hay fever is clearly borne out in the tendency for this affliction to run in families.—ED.]

EPISTAXIS.

Familial Epistaxis. H. B. Richardson[1] reports a case in the person of a German, past middle age, who had marked secondary anemia from epistaxis.

The characteristic of the case was the presence of small areas of telangiectasis on the face, particularly around the mouth and nostrils and on the upper lip. Similar areas were found on the eyebrows, on the hard palate, on the dorsum of one finger, under three finger nails and on the gals penis. There was a cherry-red area, 5x10 mm., on the right locus Kieselbachii and a circle of red nodular elevations on the left locus Kieselbachii.

A son, aged 25, had similar telangiectases on the left side of the nose, on the cheeks, the auricles, the tip of the tongue, a finger and under two finger nails. Nose negative. Both father and son were subject to frequent nose-bleed. Neither bled excessively from cuts.

Severe Epistaxis in a Woman with Diabetes Myomata of the Uterus and Acute Mastoiditis. W. Freudenthal[2] reports a case of a married woman, aged about 45, who had had severe epistaxis which two physicians had been unable to stop. Adrenalin had the opposite effect to what it generally has—it increased the hemorrhage. The bleeding was finally controlled by anterior plugging. The patient was menstruating at the time, and inquiry elicited the fact that she was suffering from multiple myomata of the uterus. It was found that she was also suffering from diabetes.

Under treatment for nasal trouble she developed an

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(1) Amer. Jour. Med. Sci., July, 1917.
(2) Ann. Otol., Rhinol. and Laryngol., June, 1917.

acute suppurative otitis media and a mastoiditis. When the sugar was reduced to 3 per cent., Freudenthal operated under gas-oxygen anesthesia with the best of results. Attention was directed to the possibility of diabetes from the peculiar appearance of the pharynx, which was dry, with a distinct superficial ulceration.

Control of Nose and Throat Hemorrhage. Lewis A. Coffin[3] says that the nose, being a tube, may be plugged at both ends and the hemorrhage controlled until the authorities are consulted and the case studied. He considers that a large proportion of nosebleeds are from the convexity of a deviated septum or from the anterior end of a turbinated body.

He advises careful inspection of these areas before plugging the nose. If the bleeding is too profuse, apply a pledget of cotton soaked in cocaine and adrenalin solutions, then search for denuded areas and apply caustics as actual cautery, chromic acid or silver nitrate. He believes that he gets a deeper effect by beginning with a weak solution of silver nitrate. For postoperative hemorrhage he recommends packing by the man who operated.

[With the last statement I agree, but my experience is that most nosebleeds come from the locus Kieselbachii and are best controlled by the chromic acid bead. Nitroglycerine hypodermically is a great help if the blood pressure is high.—Ed.]

OZENA.

Racial Occurrence of Ozena. In the course of his travels, J. N. Roy[4] examined 5000 negroes in twenty-two different colonies and finds that they do not suffer from ozena. These included mulattoes, Moors, Berbers, Peuhls, Foulahs, Hottentots, bushmen, Danakils, Somalis, Gallas, Abyssinians, and negroes in Oceania and in the West Indies.

Among the negroes in Brazil he found a large number of cases of ozena. The yellow race of Asia and its different ramifications are practically predisposed to

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(3) New York Med. Jour., Aug. 4, 1917.
(4) Laryngoscope, September, 1917.

atrophic rhinitis. Roy found it in the Chinese, Japanese, Indio-Chinese, Esquimos, Laplanders, Finlanders, Malays, Philippinos, Hovas and the redskins. He says that ozena does not exist among the natives of Africa.

He thinks the infection theory of ozena is the only one which will satisfy every demand. Among the American Indians, local conditions and surroundings cause more or less frequent appearance of the malady. Where the natives live on high ground scattered in the open air the disease is rare, but it is much more frequent in the towns and on the plains where they live under more congested conditions and breathe impure and contaminated air. Under the latter conditions it occurs in 6 per cent. of the population.

[A very interesting and suggestive article.—Ed.]

Bacteriology of the Submucosa in Ozena. C. C. Cooper[5] gives the following technique for obtaining bacteria: The anterior end of the turbinate is painted with tincture of iodine and a sterile needle connected with a sterile syringe is introduced through the iodinized area to the bone. The bone is hugged by the needle while several stabs are made along the turbinate underneath the mucous membrane. The blood and plasma are then drawn into the syringe. The amount varies in quantity in different instances from a few drops to one or more cubic centimeters. The needle and syringe are withdrawn, the needle disconnected from the syringe and the latter's contents dropped into a bouillon culture.

He concludes among other things that if the disease is due to some unknown systemic cause the submucosa and periosteum should be sterile or proved to be secondarily invaded. If due to multiple microörganic causes the seat of the pathologic changes should harbor one or more of the factors at some time during the progress of the disease. The very frequent association of Abel's bacillus with the disease justifies considering it a quite common cause, though not the specific cause. That the Perez bacillus may be one of the causes, and probably is, can not be denied, but that it is the specific etiologic factor must yet be proved.

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(5) Ibid., March, 1917.

ATROPHIC RHINITIS.

Etiology. In a paper read before the American Laryngological, Rhinological and Otological Society, H. Horn[6] expressed the belief that the *cocco-bacillus fetidus ozenae* is the true and only cause of ozena. He has done considerable bacteriologic work with this organization and endeavors to correlate it with the *Bacillus bronchiseptticus*. Its assumed close relationship to the Friedlander group seems to be settled in the negative by this work. It apparently has nothing to do morphologically with the bacillus of Abel or other members of the Friedlander family. Typical organisms of both these groups occur in the nose at the same time.

Seventy-one cases were studied. Fifteen were of simple atrophic rhinitis and neither the Perez bacillus nor the bacillus of Abel was found. Crusts and odor are usually absent in these cases. The Perez bacillus is never found in the normal nose. In forty of the cases studied the diagnosis was clinical ozena. Twenty-eight of the cases gave the Perez organisms. The other twelve cases gave the Abel bacillus or members of the Friedlander group.

ELECTROTHERAPY.

The Use of the Electric Cautery in the Nose. The electric cautery, according to W. A. Hitschler,[7] is a most useful agent for combating certain nasal conditions and, when properly used and the wound subsequently treated, is attended by no harmful after-effects. When too extensive an area is cauterized, and when subsequent treatment is curtailed or omitted, the stage may be set for pernicious sequelae, such as persistent crusting and adhesions; and these constitute the chief objections to the abuse of the cautery, but not to its use. Temporary crusting always occurs, and continues for varying periods of time—a few weeks or a couple of months at the most. Hitschler cannot recall a single case of permanent crusting. And in eliciting the symptoms of the

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(6) Laryngoscope.
(7) Ann. Otol., Rhinol. and Laryngol., June, 1917.

patient in this particular, we should keep in mind the common crusting at Kiesselbach's spot, which may bias our conclusions if no note of it has been made previously. And here is the point. At Kiesselbach's spot the metamorphosed epithelium has two dimensions, length and breadth, while after a linear cauterization it has relatively but one dimension—length. The mucous membrane finds it easier to grow over a line than over an area. In many cases, after a comparatively short lapse of time, it is difficult to determine, by the closest inspection, whether or not the cautery has been used. This applies particularly to those cases of simple vasomotor paresis without hypertrophy. Where hypertrophy or hyperplasia has been present, a linear depression or furrow may be visible; but as that is one of the results sought for in such cases, it is simply evidence that the cauterization has accomplished its purpose. And it is well within the limits of truth, supported by clinical experience, that linear cauterization practically removes the objection of crusting. When the nasal fossa is narrow, or when two opposite surfaces are cauterized at the same time, adhesions may result. In the former case, ordinary after-treatment, continued until the wound has healed, will serve as a preventive. And there is no reasonable excuse for simultaneous cauterization of opposing surfaces. Even when done accidentally, a little care and persistence in the after-treatment will obviate all difficulty.

DISEASES OF THE THROAT.

THE PALATE.

Chondroma of the Soft Palate. B. C. Giles[1] gives the history of this condition in a woman of 30. The patient's chief complaint was of pain and deafness in the right ear. She also had an obstinate cough. The cause of these symptoms was unrecognized for 5 years, during which she had two attacks of suppuration in the right ear. Dr. Giles removed the right tonsil for

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(1) Jour. Amer. Med. Ass'n., June 23, 1917.

disease and extending the incision removed the growth, which was so large it occluded all but a small chink of the nasopharynx. The growth weighed over an ounce. Recovery was prompt.

Sarcoma of the Soft Palate. B. G. Voorhees[2] reports the case of a girl of 10 who was operated on by the family physician for adenoids. He reported at this time that there was a small growth on the soft palate. A month later the mother noticed that the mass on the soft palate was growing rapidly.

The patient had dysphagia, anorexia, anosmia, dyspnea, mouth-breathing, anemia, asthenia, loss of weight, a little fever, but no pain or chills. There was an enlarged gland on the outside of the neck, which was freely movable. The tumor was about the size of a hen's egg and had its origin in the soft palate, extending so far down the throat that it was difficult to see the lower end of it. The mass was very tender to touch.

The *x*-ray report was that the mass was an abscess. It was incised and free bleeding was obtained, but no pus. The diagnosis was sarcoma. Five weeks later the child died. The laboratory report was "spindle-cell sarcoma."

A Silver Plate Method of Treatment of Adhesions of the Soft Palate to the Posterior Pharyngeal Wall. F. Hazlehurst[3] divided the palatal adhesions under anesthesia, then introduced a thin silver plate approximately 3 cm. square with the corners rounded. A silver wire was attached to the plate and brought out through the nose, drawing the plate into the naso-pharynx. The wire was fastened to the cheek by adhesive plaster. The patient wore the plate for eight days with practically no discomfort. The nasopharynx remained open three years later.

THE TONGUE.

Macroglossia Lymphangioma. The authors, R. D. Sleight and W. Haughey,[4] report the case of a Polish girl, aged 6, whose tongue protruded from the mouth

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(2) Laryngoscope, August, 1917.
(3) Ibid., July, 1917.
(4) Laryngoscope, February, 1918.

about an inch and could not be returned. The whole surface of the tongue was covered with what looked like a superficial growth made up of vesicles of all sizes. Many of these were of a purplish color, with a thin necrotic spot on top, appeared distended, and ruptured at the slightest provocation, exuding a bloody serum which did not clot. The tongue had been in this condition for two days but had been in a similar condition a number of times before and usually got better in about a week. After four days the trouble had subsided so that the tongue had returned to the mouth, was soft to the touch and was nearly normal in size. During the quiescent stage a small piece was removed and sections cut showing it to be macroglossia lymphangioma, a rare lesion of the tongue. It is congenital, but the enlargement of the tongue may follow injury.

The etiology is not at all clear. Lymphangioma macroglossia exists in three forms:

1. Capillary loops develop into arteries, thin-walled, coiled and of considerable size. The veins also increase. The blood-vessels rupture into the lymphatic spaces, which become distended partly with circulating blood and partly with blood clot.

2. Dilatation of the lymph spaces is accompanied by inflammation.

3. Small, round cells collect in the connective tissue between muscular fibers, among the lymph spaces and between the cells. These cells are not replaced by fibrous tissue, but go on to form lymphadenomatous masses.

Butlin says that there is only one treatment of lymphangioma, and lymphangiomatous macroglossia—wedge-shaped excisions.

Kuhn says that inasmuch as the condition most often occurs in children of delicate age and constitution, one must guard against undue loss of blood in any operative procedure.

A Rare Foreign Body in the Oral Cavity. J. L. Lougee[5] reports the case of a child of 6 years from whom he removed a ring which had surrounded the tongue and had apparently been overlooked for four years during which time it had caused ulceration of

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(5) Laryngoscope, June, 1917.

the frenum, permitting the tongue to be unusually mobile. The boy had had defective speech and foul breath. The ring was cut by scissors and removed without difficulty. The ulcerated area healed rapidly and the speech defect entirely disappeared.

The Plica Triangularis and Its Morphologic Variations—A Causative Factor in the Production of Foci of Infection and Irritation. F. G. Murphy[6] thinks that the plica triangularis is deserving of more attention than it has received in the past.

It is attached to the superior border of the posterior pillar and to the posterior edge of the anterior pillar and is inserted into the lateral aspect of the tongue. As the tongue grows forward before and for some months after birth the plica may be reduced so that it has apparently disappeared. Murphy thinks that the size of the plica is governed to some extent by heredity. It varies in size from an inconspicuous border along the anterior pillar to a size covering the greater part of the tonsillar fossa.

It has been observed for a number of years that where the plica has entirely receded from the tonsil, the tonsil rarely, if ever, causes trouble.

The crypts of the tonsil are emptied at frequent intervals by the contraction of the superior constrictor and the palatal muscles at the base of the tonsil during the act of swallowing.

When the plica covers the tonsil to a considerable extent this normal emptying is interfered with, and food, mucous, and bacteria accumulate in the crypts of the tonsil.

Murphy thinks that a plica partly covering the tonsil is the cause for this failure of the crypts to empty and has devised a method of relieving this condition. After severing the plica he says patients often state that they can swallow more easily than before.

[There is some truth in Murphy's contention that faulty drainage of tonsil crypts because of anatomic variation is a source of trouble, but we feel that he places undue importance on the relief afforded by his method of operation.—Ed.]

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(6) Ibid., May, 1917.

THE PHARYNX.

Nasopharyngeal Fibromyxoma, Undergoing Sarcomatous Changes. A case of fibromyxoma removed from the nasopharynx of a seventeen-year-old boy by means of an adenoid curette and snare is reported by L. J. Goldbach.[7] Very little bleeding followed, although the patient had been troubled very much by bleeding previous to the operation. The growth measured 30x20x15 mm. Two months later there was no evidence of recurrence. The laboratory diagnosis was fibromyxoma, undergoing sarcomatous changes.

Stenosis of the Nasopharynx: Operation with Prosthesis. H. E. Isaacs[8] reports a case of stenosis of the nasopharynx in a nurse, aged 25, in whom the trouble followed tonsillectomy. The blood gave a strongly positive Wassermann reaction, enabling the diagnosis to be made a year and one-half after the symptoms began. Under antiluetic treatment the Wassermann became negative and the ulcer in the throat healed. The opening into the nasopharynx was dilated eight times, but contraction was prompt.

Because of the scar tissue surrounding the opening, a flap operation was deemed impracticable. A metal pharyngeal tube was constructed to be attached by wires to the teeth. Under rectal anesthesia the opening was incised laterally until the finger could be introduced into the nares. The tube was introduced and held in place by the attachments to the teeth, and was worn more or less steadily for two weeks. The patient is able to eat with the tube in place, but the voice is somewhat clearer when the tube is removed.

It is the intention of Isaacs to have the patient wear the tube until the contractions of the scar tissues cease. He thinks that in this case the primary luetic infection occurred in the throat some time after the tonsil operation.

Parapharyngeal Abscess. H. S. Reynolds[9] reports a case in a girl of 4 years, following measles. She had a

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(7) Laryngoscope, February, 1918.
(8) Ibid., December, 1917.
(9) Jour. Amer. Med. Ass'n., May 19, 1917.

bilateral suppuration of the ears and "talked through her nose." She also had cough and fever.

There was torticollis and also swelling under the mandible on the right side. Behind the right posterior pillar was a conspicuous soft swelling without fluctuation. Difficulty in swallowing occurred. The swelling was incised inside the throat and pus evacuated. The patient recovered.

Excision of the Retropharyngeal Gland. Norman Patterson[1] has done this operation twice. Nearly all retropharyngeal abscesses develop in this gland, which finally bursts into the surrounding tissues.

There are two of these glands, one on either side of the median line (Figs. 21 and 22). The author says that all cases of tuberculous retropharyngeal abscess should be opened from outside the neck. In some cases he would go farther and remove the gland. He incises behind the sternomastoid, then works inward toward the pharynx between the sternomastoid and carotid sheath in front and the splenius capitis and levator anguli scapuli behind. The gland is removed and the wound closed after inserting a small drain. A tuberculous abscess is opened as above and then the abscess wall is curetted.

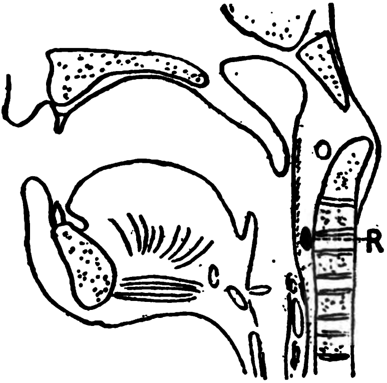

Fig. 21. Sagittal section, showing position of retropharyngeal gland (R).

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(1) Lancet, March 31, 1917.

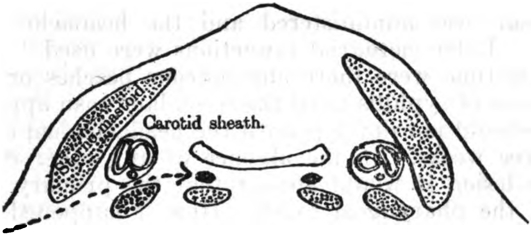

Fig. 22. Transverse section, showing the position of the retropharyngeal glands. The arrow shows the line of dissection.

[An unnecessarily severe surgical procedure to relieve a condition that is cured very simply by making an opening in the pharynx *via* the oval cavity.—Ed.]

Epithelioma of Posterior Pharyngeal Wall Cured with the Electrocautery. This case is reported by Dunbar Roy.[2] The patient was a woman of 27, who had had soreness and throbbing in the throat for three mouths. Examination showed a rounded ulcer on the posterior pharyngeal wall at center, one-half of which was hidden by the soft palate; dirty grayish in appearance, with edges sharply defined; about one-half inch in diameter, and extending as deep as the superficial aponeurosis. A piece excised showed it to be an epithelioma.

It was removed by means of the electrocautery point, well outside of its edges. No reaction and no discomfort followed. Healing was perfect under one application, and there was no sign of return after three years.

Chancre of the Pharyngeal Tonsil. H. C. Haden[1] reports the case of a married woman, aged 25, who came to him complaining of headaches. The examination was negative except that on posterior rhinoscopic examination the pharyngeal tonsil was swollen, red, and ulcerated. The headache was so severe that it was necessary to use morphine to control the pain. On the third day the patient expectorated a portion of the pharyngeal tonsil ⅝ inch long by ¼ inch wide. Microscopic examination showed numerous living *Spirochetae pallida*. At the same time, a typical secondary rash was beginning to make its appearance on the body.

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(2) Ann. Otol., Rhinol. and Laryngol., March, 1917.
(1) Laryngoscope, August, 1917.

Salvarsan was administered and the headache disappeared. Later mercurial inunctions were used.

At no time were there any mucous patches or other symptoms of syphilis until the secondary rash appeared. The rash did not develop until the headache had existed for three weeks. In the absence of any other demonstrable lesion it would appear that the primary lesion was in the pharyngeal tonsil. How it happened to be located in that region is not explained.

Adenoiditis. Carolus M. Cobb[2] says that the functional symptoms of a fully developed case are characteristic, the breathing is choked, the voice is muffled, and there is often a convulsive cough. There is a feeling as of a foreign body, and a burning sensation at the back part of the nasal fossae. Blowing the nose causes sharp pain in that region. There is a constant frontal headache. The ear complications vary from a sense of dullness through various degrees of involvement to acute suppurative otitis media.

Physical signs: The throat shows an intense catarrhal inflammation, there is a red band on both sides behind the posterior pillar. The pharyngeal tonsil may be seen to be inflamed. The glands at the angle of the jaw are generally enlarged.

Treatment should be by rest in bed, free catharsis and elimination. Sprays are useless and douches not only useless but dangerous to the ears.

Diseased Conditions of the Fossa of Rosenmueller. S. Yankauer[3] concludes that the diseased conditions of the fossa of Rosenmueller may give rise to:

1. A degree of nasal obstruction equally as great as that caused by hypertrophied adenoids; and persistent nasal obstruction after the removal of large masses of adenoids may be explained thereby.

2. Secretion pouring over the tip of the Eustachian eminence, when in front of the salpingo-nasal fold is indicative of disease in the posterior group of nasal accessory sinuses. Secretion in the fossa of Rosenmueller behind the salpingo-nasal fold, particularly when associated with adhesions in this region, may cause a

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(2) Med. Record, May 19, 1917.
(3) Laryngoscope, December, 1917.

clinical picture closely resembling disease of the accessory sinuses even though the latter are entirely free from pathologic changes.

3. It is not impossible that a fossa whose drainage is obstructed may be the focus of a general systemic infection.

4. Reflex nasal and laryngeal neuroses may have their origin in this region.

Vincent's Angina among the Troops in France. Captain R. J. C. Bouty,[4] R. A. M. C., says that the number of cases of Vincent's angina among both the British and French troops in France has shown a gradual and marked increase during the last two years. In time of peace this disease forms about 2 or 3 per cent. of all throat diseases among the French army. Recent statistics from a British military hospital in France show the proportion to be as high as 23 per cent.

The organism of the disease is one normally present in the mouths of healthy individuals. Vincent himself considers excessive smoking one of the chief predisposing factors. It is a disease prevalent among students working in the dissecting-room, and in hospitals generally, and among nurses.

A chronic or severe form is sometimes seen persisting for several weeks. Some deaths have occurred in French hospitals, in which the primary cause was Vincent's angina.

The complications which may occur are: Adenitis of the cervical glands in nearly every case; pyorrhea alveolaris; stomatitis and gingivitis; quingy is not an uncommon complication; gastro-enteritis; nephritis and albuminuria; ulceration of the pharynx, on some occasions causing perforation of the carotid artery; bronchitis; laryngitis, with ulceration of the vocal cords; pleurisy, empyema, otitis media, cachexia, and endocarditis.

A case of gangrene of the vulva and perineum caused by *B. fusiformis* and Vincent's spirochete in large numbers has been recorded by Spillman.

The same organisms have been found complicating a syphilitic chancre of a phagedenic tendency has been noted by Laimois, and the same association has been

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(4) Brit. Med. Jour., Nov. 24, 1917.

When the arytenoid on one side is involved a total laryngectomy is safer than a hemilaryngectomy. Primary union is the exception in total laryngectomy. Prior to operation every endeavor should be made to put the mouth in as clean a condition as possible by the extraction and treatment of diseased teeth.

He lays stress on the following points:

1. The technique should be so planned as to prevent the entrance of blood into the trachea. The hemostasis employed in other surgical work is not sufficient in this operation. Before the trachea is opened, an absolutely dry wound is imperative. When the trachea is cut across, all small bleeding points must be secured at once, and a snug fitting tracheal tube must be at hand for immediate insertion. If blood escapes into the trachea, it should be sucked out by negative pressure before it has time to pass the bifurcation.

2. Wound contamination from the open trachea and pharynx should be minimized by quickly closing the former with the breathing tube and by plugging the latter with a piece of gauze large enough to fill the pharynx and mouth.

3. Drainage wicks should be placed in two danger zones, namely, under the pharyngeal closure and behind the tracheal stump. The latter drain lies across the direct pathway of mediastinal infection.

4. A properly balanced diet is given from the start. This is accomplished by the use of a feeding tube introduced through the nose into the esophagus during the operation and left in place as long as required.

5. Strict attention must be given to drainage when infection occurs. Suction does much here to cleanse the wound of pus and tenacious mouth secretions.

6. The absence of lung complications in my cases was partly due, in my opinion, to the use of intertracheal suction, applied through a catheter, introduced as far down as the bifurcation and, at times, below. This catheter is used, as indicated by the amount of tracheal secretion, at least from two to four hours for a few days following the operation. Two physiologic principles underlie the expulsion of secretions from the trachea, namely, normal ciliary action and normal cough. By

normal cough is meant the compression of air behind the closed glottis and its expulsion by a sudden release of this closure. In the open trachea normal cough is impossible, and, following operative traumatism, the ciliary action of the tracheal mucous membrane is, at least temporarily, in abeyance. Hence there is a tendency for tracheal secretions, much increased after laryngectomy, to enter the lungs, producing well-known consequences.

7. If it can not be decided whether a hemilaryngectomy or a total laryngectomy is indicated, the larynx should be split and its interior carefully inspected. If still in doubt, MacKenty would strongly advocate the more radical procedure.

MacKenty has operated on nineteen patients by this method with but one death that could be attributed to the operation. This patient died of sepsis three weeks after the operation.

In the discussion, D. Crosby Greene said that the treatment of carcinoma of the larynx by radium had not been so successful as operative treatment. He has found that posture is of great advantage in the after-treatment of these operations. He places the patient face downward.

Henry W. Horn thinks that total extirpation of the larynx can be done under local anesthesia without any "brutality."

Joseph C. Beck urges a total laryngectomy whenever he makes a positive diagnosis of cancer of the larynx. He does not allow the fistulous opening into the pharynx to close, but purposely keeps it open for the insertion of an artificial larynx.

Suspension Laryngoscopy. H. L. Pollock[7] directs attention to this method, which has been very much neglected in the hands of otolaryngologists throughout the country.

He agrees with Beck in giving the following as indications for the use of suspension laryngoscopy: Carcinoma, adenocarcinoma, papilloma, fibroma, angioma, syphilis, tuberculosis, rhinoscleroma, cicatricial stenosis, paralysis, foreign bodies, burns, asthma, post-traumatic tracheal stenosis, bronchiectasis, suction of secretion for

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(7) Ann. Otol., Rhinol. and Laryngol., September, 1917.

bacteriologic examination, direct intubation, simple laryngitis, post-typhoidal chondritis, atrophic laryngotracheitis, hysteric aphonia, suspected thymus enlargement, tracheal compression by thyroid enlargement, aortic aneurysm, normal cases.

Pollock uses general anesthesia in children and infants given by blowing the vapor through the mouth or through the tracheotomy tube when tracheotomy had been previously done. In adults local anesthesia is used.

For local anesthesia he uses applications of flake cocaine applied by dipping an applicator into adrenalin solution and then into the cocaine and making the application to the mucous membrane back of the tongue, pharynx and larynx. In some cases he has used as much as 4 grains to a single patient and has never seen the slightest toxic result.

A Résumé of a Year's Work with Suspension Laryngoscopy. To prevent fracture of the alveolus, R. C. Lynch[8] places a strap under the occiput and clamps it into the angles of the pear-shaped ring, thus relieving the pressure of the tooth plates against the teeth.

In order to prevent other tooth injuries, the writer uses dental impression spoons filled with moulding compound, which offers complete protection to the teeth, facilitates the introduction of the spatula, and makes it easier to keep the spatula in the middle line.

He also describes a table which can be raised twenty inches, the top can be tilted and can be moved in a circle. There are foot and shoulder braces.

Regarding intrinsic epithelioma of the larynx, his experience has been exceptionally good with endolaryngeal removal, but feels that his experience is not large enough to reach definite conclusions. Dissection under suspension is not difficult, he says, and can be done without permitting an instrument to touch the tumor mass. Nineteen cases of papilloma have been successfully operated on by dissecting well below the base, curetting and painting with alcohol.

Pedunculated fibroma, vocal nodules, and cyst of the arytenoepiglottic fold, pachydermic laryngitis, perichondritis of the thyroid, fracture of the thyroid cartilage,

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(8) Ann. Otol., Rhinol. and Laryngol., March, 1917.

tubercular laryngitis, abscess of the epiglottis, and foreign bodies in the trachea and esophagus were all cared for by means of the suspension apparatus.

Voice Production from the Standpoint of the Laryngologist. The average person, says H. P. Howell,[9] can sing but from two to two and one-half octaves, while in speaking we confine ourselves to a half octave of the middle voice.

The quality of a tone is affected largely by its overtones and harmonics. The blast of air through the glottis, in the case of the voice, sets the vocal bands in motion. This produces the primary sound. This simple neutral sound is somewhat enhanced by the ventricles of the larynx; it gains still more from the pharynx and buccal cavity; the low notes bring the chest walls into vibration as an additional resonator.

The peculiar quality or timbre of the individual voice arises from the accessory sinuses and the bony framework of the face.

Sometimes we are surprised to find in a robust man a small, squeaky voice. This is usually due to poorly developed facial cavities. The Maori of New Zealand possess peculiarly dead voices, though they have magnificent physiques. Anatomic researches show the lack of resonance in their voices is due to an underdevelopment of their accessory sinuses.

In speaking and singing in the lower range of the voice, the cricothyroid is the chief muscle. Therefore we find it more used in men than in women, and in basses and baritones than in tenors.

According to Behnke, "a register is a series of tones which are produced by the same mechanism." A new register marks a change in the quality of a tone corresponding to the change in mechanism, and at the point where that variation occurs we term it the "break" in the voice. For practical purposes we can regard two registers as sufficient.

During phonation in the lower and middle range, the vocal bands do not touch, as the cricothyroid is a tensor muscle, and the intrinsic muscles do not come into play during this part of the mechanism.

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(9) Ibid., September, 1917.

But as the scale ascends, the cartilaginous glottis is closed by the arytenoideus, the cords come together more and more, both anteriorly and posteriorly, till on the very highest notes only a small oval opening is evident in the front third of the glottic fissure. It is at this period that the thyro-arytenoid is effecting its complex adjustment, acting in conjunction with the lateral and posterior crico-arytenoids.

There are certain terms used in the singing world of which laryngologists must gain a working knowledge. We should appreciate the difference between singing "too white" and *"dans le masque."* In the former method the voice is brought too far forward in the mouth; the tones are clear cut but colorless, and they do not charm, for they lack overtones. In the tones sung too *"dans le masque"* the voice is confined in the facial cavities, and where we have this to excess the quality of the tones becomes too covered and "hooty." This shuts up the voice, prevents singing high notes and interferes with clear diction. This is not a difficult fault to rectify, but sufficient to keep a good voice in the ranks of mediocrity, if continued.

The term "stroke of the glottis," or *"coup de glotte,"* is a sudden attack with the throat muscles rigid and the vocal cords over-tense, with margins that touch along their middle in the production of the second. This is a serious fault, and one that is certain to bring disaster to the voice.

The tremulo in good singing today is never justified, and ordinarily we find it is a defect due to an uncertain attack and a poor respiratory support. Vocal lessons should begin at any time, the earlier the better, but with strict limitations in the compass of the voice. Choral singing in our institutions is harmful.

We must employ great judgment in advising the use of the voice during the early period of adolescence, when the larynx is undergoing its most rapid growth.

Duality of Voice. J. S. Greene[10] states that the vitality of the genital organs has a decided influence on the development of the voice, it being noticed in both young

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(10) New York Med. Jour., June 23, 1917.

and old, in the young when the genital organs obtain full vigor and in the old when there is loss of vigor.

A falsetto voice is a voice often reckoned to the head register, its volume and area being almost as large as the chest register, reaching about d^1 to f^2. It is an octave above the chest register. It is of a thin shrill quality, sounding forced or unnatural and, as its name implies, is a false voice. In brief, it is a child's voice produced by an adult, originating at that period of life when physically the boy or girl is man or woman in everything but voice. This voice suggests a lack of muscular control besides a disturbed balance in the respiratory act. Of the vocal anomalies that occur during or following mutation the persistent falsetto voice is the one most frequently observed. While the condition occurs in both males and females, most of the cases that come under observation are in males.

The relationship between pubescence, voice and genital organs had been noticed by lay persons as well as by medical men. From remote antiquity among the Orientals, as also at a later period in Greece eunuchs were employed; and on account of the unnaturalness of their voices, observation and comment was made. Until recently in Italy castration of boys was practiced in order to hinder the natural development of the voice. These castrated boys were carefully trained vocally, so that when older they comprised the adult soprano singers of the Sistine Chapel. At present there exists a secret religious sect in Russia known by the name of Skopzi, whose members voluntarily undergo emasculation in order to avoid sexual sin or temptation. They are recognized by their falsetto voices. From time immemorial it has been well recognized that a definite relationship exists between the sexual organs of the male and his vocal apparatus. In the female this relationship has been demonstrated only comparatively recently. Since oöphorectomy has been done infinite voice changes have been noted. Following an oöphorectomy the female voice assumes a slightly more masculine timbre without involving much change of pitch.

From the above one can readily understand why adult males who speak in high pitched, childish voices often carry a stigma of doubtful sexuality which is decidedly humiliating and undeserved. Lack of knowledge of the subject has resulted in misleading conclusions. If it were generally known that a falsetto voice may be a purely functional condition, that there may be no pathologic involvement of the organs of voice or the organs of generation, and that the condition may be classified as a faulty habit, judgment would not be so readily passed on a person's physical condition by simply hearing his voice.

THE BRONCHI AND ESOPHAGUS.

The Technique of Suspension in Bronchoscopy and Esophagoscopy. R. C. Lynch[1] considers that infants and young children are ideal subjects for suspension because of their natural muscular development, their flexible necks and the short distance from the upper teeth to the larynx. They are also the class of patients in which the greater number of foreign body cases occur.

Lynch does not use anesthesia in young children and infants for bronchoscopy. The head of the table is not dropped as for the regular technique, it being more convenient to have the table flat. Just sufficient extension is made to bring the posterior two-thirds of the larynx into view; then the neck is straightened by the elevation of the traveling crane and the posterior two-thirds of the larynx is well in view in many instances with the child's head hardly elevated from the table.

The child is prepared by being wrapped firmly in a sheet. One can use a short spatula and follow along the base of the tongue, using the bronchoscope to elevate the epiglottis. A solution of 5 per cent. cocaine is then applied to the upper part of the larynx only, being sure that the trachea receives none of the anesthetic fluid on account of the possibilities of diminishing the cough reflex, Nature's only method of ridding the bronchial tree of excessive secretions. The surface of the larynx and vocal cords are covered with a sterile vaseline to permit the easy passage of the tube.

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(1) Laryngoscope, July, 1917.

Lynch prefers the Killian baby set of bronchoscopes which are equipped with a hollow, smooth mandarin, the blunt round surface of which will produce no traumatism at all. They give the largest working lumen and can be illuminated with a Brünings handle, Kirstein lamp, or an ordinary head mirror with a strong nitrogen lamp.

Lynch finds the introduction of the esophagoscope a very simple affair under suspension.

A New Method of Working Out Difficult Mechanical Problems of Bronchoscopic Foreign-Body Extraction. C. Jackson[2] finds that the stock instruments of the instrument maker have three faults: (1) They may not be of quite the proper shape; (2) they may have been subjected to too sharp bending, which destroys the tensile strength; (3) if the shape is not exactly proper the instrument will not accomplish its purpose.

In a difficult foreign body case Jackson tries out the instruments on the work bench, using a piece of rubber tubing for a manikin. One end of the tubing is anchored in a small vise which lies on the table. If the instrument will not enable the endoscopist to disentangle the foreign body in the manikin, obviously they will not enable him to do it in the living patient; and a continuation of careful, patient study is undertaken until the problem is solved.

Jackson warns against using probes that are hooks; that is, they should not approach too closely to a right angle. They always should be so shaped that they can be withdrawn. To have an instrument so shaped as not to be able to disengage it would be a serious or possibly fatal predicament as has happened in the use of the snare.

He says:

Tool-steel probes formed by the bronchoscopist himself, to suit the particular case, are an addition to our means of solving mechanical problems of bronchoscopic foreign-body extraction.

The preferred form can be used to close a bar pin, which can not be done with any of the different forms of safety-pin closers.

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(2) Laryngoscope, October, 1917.

To pursue a foreign body downward is to court disaster.

Care is necessary to avoid forming hooks that could catch in bronchi or become entangled in the foreign body. The shape should be such as to favor "unscrewing" out if caught.

Great care should be taken to avoid injury to the patient. Any number of trials may be had if no harm is done. One serious trauma may terminate the case.

Foreign Bodies in the Bronchi. S. G. Iglauer[3] reports two cases. One was a steel jacketed bullet in the left bronchus of a boy of 6 years; size of the foreign body was 25x7 mm. The second case was in a boy of 12 who had inhaled a brass ferrule from an umbrella tip; it lodged in the right bronchus. Iglauer devised an instrument with a threaded tapering end, which he screwed into the opening of the ferrule and thus extracted it.

He reports a third case in which a girl of 6 inhaled an upholstery tack. Three or four hours later she coughed it out.

Copper Brad in the Left Inferior Bronchus. The patient in the case reported by R. McKinney[4] was a little girl of 5 who had inhaled a copper brad from an old suitcase four weeks previously. Following the accident she had a cough and some fever. The symptoms not clearing up, a radiogram was taken of the child's chest, which showed the brad at the bifurcation of the trachea. Under ether anesthesia bronchoscopy was done and the foreign body was not found. The next day the temperature went up to 101° F., and marked symptoms of acidosis set in, with protracted vomiting and depression of the patient. The *x*-ray pictures showed the brad, which had an oval head and a long prong, to be located in the left bronchus with the oval surface upward and completely filling the lumen of the tube. Owing to this when bronchoscopy was done for the second time about two weeks later, although the foreign body was seen, it could not be grasped with the forceps. About a month later bronchoscopy was again done under a light chloro-

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(3) Interstate Med. Jour., October, 1917.
(4) Laryngoscope, February, 1918.

form anesthesia. This time the brad was caught with the Jackson long alligator forceps and removed.

Removal of a Fragment of a Tracheotomy Tube from the Lung, Six Years After Its Inspiration. F. R. Packard[6] reports a case of an Italian, aged 33, who during an attack of typhoid fever twelve years before required intubation. When the intubation tube was removed, tracheotomy was done and the tracheotomy tube had been worn ever since. For six years he had had violent attacks of coughing, accompanied by expectoration of blood and much pain in his chest. An *x*-ray examination showed a foreign body lodged in the right bronchus. The patient was etherized and the foreign body removed by means of the Jackson bronchoscope.

Bronchoscopy and Esophagoscopy. To make a success of this line of work, says J. W. Murphy,[7] it is almost a necessity to be a born mechanic, since this happy faculty can hardly be acquired from books. One of the very great dangers is prolonging the examination, or an attempt to extract a foreign body too long. It is very difficult to quit, especially when you feel that the next attempt is going to succeed. In this manner the examination is apt to be prolonged beyond the point of safety.

The author regards every foreign body either in the bronchi or esophagus as a dangerous case and tries to make the parents understand this in the case of children. He also impresses upon them that the longer the removal is delayed the more serious the prognosis becomes.

He has had several unhappy experiences along this line, and the more he sees of this work the more he is convinced that every foreign body case is dangerous to the life of the patient. Too frequently the family physician attempts to relieve a patient of a suspected foreign body in the esophagus by forcing it down into the stomach.

Endothelioma of the Right Bronchus Removed by Bronchoscopy. Chevalier Jackson[8] reports this case:

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(6) Ann. Otol., Rhinol. and Laryngol., March, 1917.
(7) New York State Jour. Med., November, 1917.
(8) Amer. Jour. Med. Sci., March, 1917.

The patient, aged 35, had had good health until five years ago, when his ill health started with a bad cold, lasting one year. Then he spat blood. During the summer he was better, but during the winter and spring he was worse, his symptoms being those of a heavy cold. He referred his sensations to the right side. They are "restriction, swelling, compression, wheezing." He also complained of a sensation as of a ball valve in the right bronchus shutting off his breath, at times when breathing in and at others when breathing out. He spent two years in a sanitorium for tuberculosis without tubercle bacilli ever being found. The sputum contained some small whitish masses of solid matter, which, on examination, showed many large cells of varying shapes. Some oval, some spindle-form and others polygonal. They are unlike any of the cells ordinarily seen in sputum and are so like cells from a new growth that a diagnosis of tumor is justifiable. The first fluoroscopic examination gave the appearance of an unresolved pneumonia. A second, two days later, was diagnosed as atelectasis due to right bronchial obstruction. Careful physical examination gave symptoms that only fitted with that of a movable intrabronchial tumor.

Under local anesthesia a moderate amount of secretion was found coming from the right bronchus. When this was cleared away a tumor was found filling a dilatation of the right stem bronchus, springing from the right bronchial wall just above the middle lobe bronchus. It was extirpated by a few nips of the bronchial tissue forceps. About two ounces of blood were expectorated. The temperature rose to 102.2° F., but in a week all became normal and the patient has had uninterrupted good health to the present time—nine months. Frozen sections of the growth give the appearance of an endothelial growth.

Jackson's conclusions are:

1. Diagnostic bronchoscopy is indicated in cases of monolateral "asthma," bronchitis, bronchial obstruction, and in cases of tuberculosis in which persistent search fails to show tubercle bacilli.

2. Bronchoscopic removal of an endobronchial tumor is feasible under local anesthesia.

3. General anesthesia might have permitted clotting of blood in the lower bronchi before expulsion, involving septic risk.
4. Bronchoscopic removal may be justified in a malignant endobronchial growth if small, circumscribed and not ulcerated.
5. As this is the only recorded case of apparent cure of an endothelial endobronchial tumor by bronchoscopy, and only the second endoscopic removal of any form of malignant growth from a bronchus, it would be unwise to make too many or too sweeping deductions.

Stricture of the Esophagus. C. J. Imperatori[9] reports three cases of stricture of the esophagus following the accidental swallowing of concentrated lye solution.

The first patient, aged 4 years, had swallowed lye some six months before. After this she swallowed only strained soups, gruels, and milk. Endoscopic examination revealed a stricture 15 or 16 cm. from the upper teeth, this being near the region of the aorta and the left bronchus. The esophagus was gradually dilated with a Sippy instrument until a 28 Fr. was used. Later Bruening's flexible bougies were used and still later the esophagoscope as a dilator. The patient is in good condition, and eats everything without any effort in swallowing and is apparently cured.

The second patient, aged 21 years, swallowed two ounces of concentrated lye solution and then drank four quarts of vinegar water during the first twelve hours to neutralize the lye solution. For two weeks he was able to swallow liquids and then he suddenly found that he could not swallow. This lasted for two days. He was bougied, using a No. 2 Bruenings for three weeks, when a piece of bacon became enlodged in his gullet. No effort was made to remove this, and he expelled it the next day. Five weeks later he was first seen by Dr. Imperatori, who located the stricture 27 cm. from the upper teeth. The ulceration above the stricture was treated with a strong solution of silver nitrate, and later with argyrol. It healed in about ten days. Following this he was bougied until in the course of three months the stricture was dilated to the size of 28 Fr.

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(9) Laryngoscope, November, 1917.

The third patient, aged 28 years, swallowed concentrated lye solution when he was 12 years old. Later he was bougied every day for six months, and for eighteen months every other day. Thiosinamin was injected each day for six months and electrolysis was done several times. For three years following the accident he lived on strained gruels. At 15 some food became impacted in his throat, but by grasping the upper part of the neck and squeezing and swallowing at the same time he was able to push the food down. At 16 he noticed the development of a swelling in his neck, just below the jaw. On examination a stricture was found 2 cm. below the cricoid. The stricture has been gradually dilated until the bougie which equalled a 15 Fr. was passed. The patient's improvement is marked, although more bougieing will be necessary.

Conclusions. The reason for reporting these cases is to draw attention to the severe after-results of the caustic on the tissues of the esophagus, the rarity of the necessity of doing a gastrostomy, and the method of treatment of these strictures that is safest and easiest in overcoming them.

Regarding the immediate treatment, no bougieing should be attempted until the immediate effects of the burn have subsided and repair of the injured tissues has begun. Water hunger can be overcome by the Murphy drip and nutrient enemata. Usually within from three to five days small amounts of fluid can be swallowed, without great discomfort. From this time on the patient will gradually begin to take a more liberal and regular fluid diet. Of course, should this treatment not prove of avail, gastrostomy should be done.

Later treatment is undertaken as soon as repair begins to take place, and we know this by the patient being able to take more freely of a liquid diet. The mucous membrane should be inspected in order to ascertain the extent of injury and the amount of repair under way. Ulcerations should be touched up with silver and argyrol solutions. As soon as these ulcerations begin to heal, bougieing *per tubam* should be commenced. By the use of the esophageal speculum and the esophagoscope the orifice of the stricture may be located and a filiform passed through without traumatizing the parts, as is usually done when dilating blindly. The dilatation may be started with the use of olives threaded on the filiform. For these very small strictures, the use of the Jackson-Guisez bougie is very satisfactory, particularly in those strictures under 18 Fr.

The Sippy set of olive, carrier and filiform is very useful, for safely dilating those strictures in sizes over 19 Fr. The bougies of Ingals-Mackenzie for the dilatation of those strictures from 30 Fr. up are useful, their ovoid shape rendering them easy to pass behind the larynx, and they may be left *in situ,* for a length of time, without much discomfort to the patient. Mechanical dilators are useful, but for most cases, even the difficult ones, the above mentioned dilators will be found to suffice.

Blind bougieing for the smaller strictures, that is, say arbitrarily under 18 Fr., is not a safe procedure. Patients who will swallow a thread to be used as a guide can always be dilated with the Jackson-Guisez instruments with much more satisfaction to the patient and the operator. While it may seem unnecessary instrumentation to those who have successfully dilated these strictures by the sense of touch, we know and hear continually of patients who have had the wall of the esophagus accidentally punctured by blind bougieing and usually with fatal results.

Without any doubt or question, this method as suggested and practiced by Jackson, that is, "bougieing *per tubam,"* is the safest procedure to be used, especially in the smaller strictures in what at best is a difficult undertaking.

Foreign Bodies in the Esophagus—An Analysis of Fifty Cases. S. A. Friedberg[1] is the author of this article.

Foreign bodies are most frequently found in young children. The most prominent symptom is difficulty in swallowing.

There may be continual drooling of saliva. The child holds its hand to its neck and inclines the head to one side. After swallowing there is regurgitation of food.

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(1) Ann. Otol., Rhinol. and Laryngol., September, 1917.

Large foreign bodies by their pressure on the tracheo-esophageal wall produce respiratory disturbances to such an extent as to lead to the suspicion that the foreign body is in the air passages. Pain is intense, according to the nature of the foreign body and local reaction which it has brought about.

Careful observation will usually show a slight elevation of temperature. Complications that result from foreign bodies in the esophagus are: Esophagitis, peri-esophageal abscess, mediastinitis, or ulceration and perforation of the tracheo-esophageal wall.

The absence of a shadow does not eliminate the presence of a foreign body. In adults, fish or meat bones high up in the esophagus are almost impossible to interpret on a plate. Certain types of large buttons, said to be made of "vegetable ivory," do not give a shadow.

There are not the same contraindications to the use of general anesthesia for work in the esophagus as in the trachea or bronchi, although it is only occasionally necessary. In operating, the patient should be in the recumbent position.

The problem connected with the extraction of foreign bodies is almost entirely a mechanical one. It is well to have as definite an idea as possible as to the size and composition of the object that has been swallowed.

The danger attached to the removal of foreign bodies by any other means than under direct vision can not be too strongly emphasized. The use of probangs or umbrella bougies is rarely justified.

Friedberg cites a case of a young child with a history of having gotten a piece of pig's knuckle in the throat. A physician had attempted to remove it, and, failing, he pushed it, as he thought, into the esophagus. Instead, the foreign body went through the esophageal wall and infection was set up, and although the bone could be felt in the tissues of the neck and was removed by an external incision, death resulted from the infection.

Pollock has designed a spatula in which the tip is cut out in a crescent shape and the points reach well toward the pyrform fossae, thus allowing the center portion to be free and permitting direct approach to the epiglottis and center of the base of the tongue.

Probably the most frequent use of this procedure is for examination and removal of portions of tissue for microscopic examination or where malignancy is suspected. Under suspension one can see the entire larynx exposed, and can study the entire limitation of growth and can very easily remove a portion for microscopic examination.

Next in importance is the removal of nonmalignant tumors, particularly of the cords—*viz.,* papilloma, fibroma, angioma, and polypi.

The paper is accompanied by several case reports illustrating this condition treated by this method.

A Stone Removed from the Esophagus. This case is reported by H. Arrowsmith.[2] The patient, a man of 28, suffering from dementia precox, reported that he had a pain in this throat. On being questioned he admitted having swallowed a pebble about as thick as his finger and somewhat longer than that in diameter, the previous day. He refused to swallow solids and promptly regurgitated liquids. A stomach tube was halted ten inches from the incisors. Under oil-ether colonic anesthesia a medium sized Mosher ballooning esophagoscope was passed down to the foreign body, then the Jackson mechanical spoon was passed to one side of the stone, turned to a right angle and pulled upward with force enough to break the instrument but not to budge the stone. Then the Jackson safety-pin closer, made on the same order as the spoon, was introduced in the same way. Tube, stone and pin closer were withdrawn together. The stone measured 2x1⅜x1 inch, the greatest impacted circumference being 3¾ inches; its weight was 630 grains.

Co-existent Carcinoma, Tuberculosis, and Syphilis of the Esophagus. L. W. Dean and J. B. Gregg[3] report a case having this combination of diseases: The patient was a white man 60 years of age, who had his first trouble in swallowing twenty-eight years before. This lasted for five weeks.

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(2) Laryngoscope, December, 1917.
(3) Ann. Otol., Rhinol. and Laryngol., September, 1917.

Five months before entering the hospital a piece of meat seemed to be lodged just back of the sternum and caused violent coughing, but it was apparently dislodged on drinking some liquid.

Six weeks later he noticed that he was loosing flesh and a little later began to have trouble in swallowing. Gradually the dysphagia became so great that solid food was not eaten. He coughed a great deal, but never raised blood.

At the time of admission he was unable to swallow anything with surety. He had lost fifty pounds in weight and was markedly pale and anemic. He complained of a pain in the chest just behind the sternum severe enough to waken him at night.

The family history gave no clue to the disease he has. He denied venereal history. On examination the teeth were found in very poor condition, with marked pyorrhea. The pharyngeal mucosa and posterior buccal mucosa were markedly reddened. The lower pharynx and larynx were covered by a profuse amount of mucous. On swallowing liquids he coughed and choked, nearly all the fluid being ejected.

The radiogram taken after swallowing bismuth and acacia mixture showed an S-shaped stricture of the esophagus.

The patient was esophagoscoped under cocaine anesthesia. A nodular mass was found on the right side of the esophagus, one and one-half inches below the cricoid cartilage. A piece of this was removed for examination and reported by Dr. Albert as carcinoma and tuberculosis of the esophagus.

The patient was placed on antiluetic treatment of mercury inunctions and potassium iodide. A marked improvement in dysphagia was immediately noticed.

The marked improvement in the swallowing after antiluetic treatment alone, and in the presence of a positive Wassermann, suggests a definite luetic element in this mixed tumor.

Radium in Carcinoma of the Upper Air Passages. D. Bryson Delavan[5] reports on the radium treatment of 184 cases of carcinoma of the upper air passages. The

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(5) Med. Record, June 30, 1917.

cases considered to have completely regressed are as follows:

Of 24 cases involving the lips, 6 cured.
Of 3 cases involving the nose, none cured.
Of 25 cases involving the maxilla, 4 cured.
Of 11 cases involving the cheek, 4 cured.
Of 12 cases involving the mandible, none cured.
Of 6 cases involving the floor of mouth, none cured.
Of 26 cases involving the tonsil, 5 cured.
Of 50 cases involving the tongue, 2 cured.
Of 27 cases involving the larnyx, 1 cured.

The earlier in the disease the treatment is used the better the progress. The present results of radium treatment are better than were obtained last year.

Malignant Disease of the Upper Respiratory Tract. Joseph C. Beck[7] thinks that all interested in this work should become members of the American Society for the Control of Cancer. The earliest possible diagnosis should be followed by the most radical intervention, not necessarily surgical. All sources of local irritation should be corrected. When metastases have occurred and life is unbearable, sufficient morphine should be used to keep the patient free from pain. Even though operation offer but a small chance of recovery it is our duty to operate. Cutting out pieces for examination (except by the cautery knife) is apt to aggravate the trouble. "Follow up your cancer cases."

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(7) Ill. Med. Jour., September, 1917.

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